





SEVENTH ANNUAL REPORT
OF THE
PENNSYLVANIA
DEPARTMENT OF AGRICULTURE.

PART II.



1901.

WM. STANLEY RAY,
STATE PRINTER OF PENNSYLVANIA.
1902.



PENNSYLVANIA DEPARTMENT OF AGRICULTURE.

OFFICIAL LIST.

JOHN HAMILTON, *Secretary*,
State College, Centre County.

A. L. MARTIN, *Dep'y Sec'y and Director of Farmers' Institutes*,
Enon Valley, Lawrence County.

JESSE K. COPE, *Dairy and Food Commissioner*,
West Chester, Chester County.

BENJ. F. MACCARTNEY, *Economic Zoologist*,
Hamilton, Jefferson County.

LEONARD PEARSON, *State Veterinarian*,
Philadelphia.

M. D. LICHLITER, *Chief Clerk*,
Pittsburg.

FRANK S. CHAPIN, *Clerk, Economic Zoologist*,
Milton, Northumberland County.

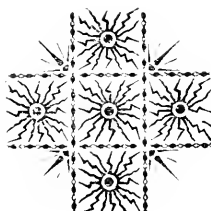
GEORGE G. HUTCHISON, *Clerk, Dairy and Food Commissioner*,
Warriors' Mark, Huntingdon County.

LEWIS VANDERSLOOT, *Stenographer*,
York, York County.

GEORGE F. BARNES, *Messenger*,
Rossville, York County.

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LETTER OF TRANSMITTAL.

Harrisburg, Pa., September 1, 1902.

Hon. Wm. A. Stone, Governor of Pennsylvania:

Dear Sir: In compliance with the requirements of the Act of Assembly of March 13, 1895, and of the custom which has prevailed in this Department, I have the honor to transmit herewith Part II of my annual report for the year 1901. The report contains lists of officers of the various State organizations of farmers in Pennsylvania, together with the Acts of Legislature by which the organizations were created, and the constitution, by-laws and declaration of principles under which they act. Some of the papers read before these organizations are included in the report, and also a number selected from those presented at the local institutes during the season of 1900-1901.

Respectfully yours,

JOHN HAMILTON,
Secretary of Agriculture.



AN ACT ESTABLISHING THE DEPARTMENT OF AGRICULTURE.

AN ACT

To Establish a Department of Agriculture and to Define its Duties and to Provide for its Proper Administration.

Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That there be and hereby is established a Department of Agriculture, to be organized and administered by an officer who shall be known as the Secretary of Agriculture, who shall be appointed by the Governor, by and with the advice and consent of the Senate, for a term of four years, at an annual salary of three thousand five hundred dollars, and who, before entering upon the duties of his office, shall take and subscribe the oath prescribed in Article seven of the Constitution. Said Secretary shall be ex-officio secretary of the State Board of Agriculture, and shall succeed to all the powers and duties now conferred by law upon the secretary of said Board.

Section 2. That it shall be the duty of the Secretary of Agriculture in such ways as he may deem fit and proper, to encourage and promote the development of agriculture, horticulture, forestry and kindred industries; to collect and publish statistics and other information in regard to the agricultural industries and interests of the State; to investigate the adaptability of grains, fruits, grasses and other crops to the soil and climate of the State, together with the diseases to which they are severally liable and the remedies therefor; to obtain and distribute information on all matters relating to the raising and care of stock and poultry; the best methods of producing wool and preparing the same for market, and shall diligently prosecute all such similar inquiries as may be required by the agri-

cultural interests of the State and as will best promote the ends for which the Department of Agriculture is established. He shall give special attention to such questions relating to the valuation and taxation of farm lands, to the variations and diversification in the kinds of crops and methods of cultivation, and their adaptability to changing markets as may arise from time to time, in consequence of a change of methods, means and rates of transportation, or in the habits or occupation of the people of this State and elsewhere, and shall publish, as frequent as practicable, such information thereon as he shall deem useful. In the performance of the duties prescribed by this act, the Secretary of Agriculture shall, as far as practicable, make use of the facilities provided by the State Agricultural Experiment Station, the State Board of Agriculture and the various State and county societies and organizations maintained by agriculturists and horticulturists, whether with or without the aid of the State, and shall, as far as practicable, enlist the aid of the State Geological Survey for the purpose of obtaining and publishing useful information respecting the economic relations of geology to agriculture, forestry and kindred industries. He shall make an annual report to the Governor, and shall publish from time to time such bulletins of information as he may deem useful and advisable. Said report and bulletins shall be printed by the State Printer in the same manner as other public documents, not exceeding five thousand copies of any one bulletin.

Section 3. That it shall be the duty of the Secretary to obtain and publish information respecting the extent and condition of forest lands in this State, to make and carry out rules and regulations for the enforcement of all laws designed to protect forests from fires and from all illegal depredations and destruction, and report the same annually to the Governor, and as far as practicable, to give information and advice respecting the best methods of preserving wood lands and starting new plantations. He shall also, as far as practicable, procure statistics of the amount of timber cut during each year, the purpose for which it is used, and the amount of timber land thus cleared as compared with the amount of land newly brought under timber cultivation, and shall, in general, adopt all such measures as in his judgment may be desirable and effective for the preservation and increase of the timber lands of this State, and shall have direct charge and control of the management of all forest lands belonging to the Commonwealth, subject to the provisions of law relative thereto. The said Secretary shall also be and hereby is charged with the administration of all laws designed to prevent fraud or adulteration in the preparation, manufacture or sale of articles of food, the inspection, sale or transportation of agricultural products or imitations thereof, and all laws relating to diseases of

domestic animals, and to the manufacture and inspection of commercial fertilizers.

Section 4. There shall be one Deputy Secretary, who shall be appointed by the Governor for the term of four years, at a salary of three thousand dollars a year, who shall also be Director of Farmers' Institutes. The other officers of the Department shall be appointed by the Governor for the term of four years, and shall be an Economic Zoologist, (*a Commissioner of Forestry), a Dairy and Food Commissioner, who shall have practical experience in the manufacture of dairy products, and a State Veterinarian who shall be a graduate of some reputable veterinary college, who shall receive an annual salary of twenty-five hundred dollars each. The Dairy and Food Commissioner shall, under the direction of the Secretary, perform the duties prescribed by an act approved May twenty-sixth, one thousand eight hundred and ninety-three. The Governor is hereby authorized to appoint one chief clerk of the Department at an annual salary of sixteen hundred dollars, one stenographer at a salary of eight hundred dollars a year, and one messenger at a salary of six hundred dollars a year, and the Dairy and Food Commissioner, the Commissioner of Forestry and the Economic Zoologist shall each have a clerk, who shall be appointed by the Governor, and who shall serve under the direction of the respective commissioners aforesaid, and receive a salary of fifteen hundred dollars a year each.

Section 5. That it shall be the duty of the Superintendent of Institutes to arrange them in such manner as to time and places of holding the same, as to secure the greatest economy and efficiency of service, and to this end he shall in each county where such institutes are to be held, confer and advise with the local member of the State Board of Agriculture, together with representatives duly appointed by each county agricultural, horticultural and other like organizations with reference to the appointment of speakers and other local arrangements.

Section 6. That the Secretary may, at his discretion, employ experts for special examinations or investigations, the expenses of which shall be paid by the State Treasurer in the same manner as like expenses are provided by law, but not more than five thousand dollars shall be so expended in any one year. In his annual report to the Governor, he may include so much of the reports of other organizations as he shall deem proper, which shall take the place of the present agricultural reports, and of which thirty-one thousand, six hundred copies shall be published and distributed as follows: To the Senate, nine thousand copies; to the House of Representatives, twenty thousand copies; to the Secretary of Agriculture, two thousand copies; to the State Librarian, for distribution among public

*Abolished by Act of Legislature of 1901, by the establishment of a Department of Forestry.

libraries and for reserve work, five hundred copies, and to the State Agricultural Experiment Station, one hundred copies.

Section 7. That the Secretary of Agriculture shall have an office at the State Capitol, and it is hereby made the duty of the Commissioners of Public Buildings and Grounds to provide the necessary rooms, furniture and apparatus for the use of the Department.

Section 8. That all acts or parts of acts inconsistent herewith be and the same are hereby repealed.

Approved—March 13, 1895.

LIST OF PUBLICATIONS OF THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE.

ANNUAL REPORTS.

- *Report of the State Board of Agriculture, 336 pages, 1877.
- *Report of the State Board of Agriculture, 625 pages, 1878.
- *Report of the State Board of Agriculture, 560 pages, 1879.
- *Report of the State Board of Agriculture, 557 pages, 1880.
- *Report of the State Board of Agriculture, 646 pages, 1881.
- *Report of the State Board of Agriculture, 645 pages, 1882.
- *Report of the State Board of Agriculture, 645 pages, 1883.
- *Report of the State Board of Agriculture, 648 pages, 1884.
- *Report of the State Board of Agriculture, 645 pages, 1885.
- *Report of the State Board of Agriculture, 646 pages, 1886.
- *Report of the State Board of Agriculture, 650 pages, 1887.
- *Report of the State Board of Agriculture, 648 pages, 1888.
- *Report of the State Board of Agriculture, 650 pages, 1889.
- *Report of the State Board of Agriculture, 594 pages, 1890.
- *Report of the State Board of Agriculture, 600 pages, 1891.
- *Report of the State Board of Agriculture, 604 pages, 1892.
- *Report of the State Board of Agriculture, 713 pages, 1893.
- *Report of the State Board of Agriculture, 646 pages, 1894.
- *Report of the Department of Agriculture, 878 pages, 1895.
- *Report of the Department of Agriculture, Part 1, 820 pages, 1896.
- *Report of the Department of Agriculture, Part 2, 444 pages, 1896.
- *Report of the Department of Agriculture, Part 1, 897 pages, 1897.
- *Report of the Department of Agriculture, Part 2, 309 pages, 1897.
- *Report of the Department of Agriculture, 894 pages, 1898.
- *Report of the Department of Agriculture, Part 1, 1082 pages, 1899.
- *Report of the Department of Agriculture, Part 2, 368 pages, 1899.
- Report of the Department of Agriculture, Part 1, 1010 pages, 1900.
- Report of the Department of Agriculture, Part 2, 348 pages, 1900.
- Report of the Department of Agriculture, Part 1, 1039 pages, 1901.
- Report of the Department of Agriculture, Part 2, — pages, 1901.

*NOTE—Edition exhausted.

BULLETINS.

- No. 1.* Tabulated Analyses of Commercial Fertilizers, 24 pages, 1895.
- No. 2.* List of Lecturers of Farmers' Institutes, 36 pages, 1895.
- No. 3.* The Pure Food Question in Pennsylvania, 38 pages, 1895.
- No. 4.* Tabulated Analyses of Commercial Fertilizers, 22 pages, 1896.
- No. 5.* Tabulated Analyses of Commercial Fertilizers, 38 pages, 1896.
- No. 6.* Taxidermy; how to Collect Skins, etc., 128 pages, 1896.
- No. 7.* List of Creameries in Pennsylvania, 68 pages, 1896.
- No. 8.* Report of State Horticultural Association, 108 pages, 1896.
- No. 9.* Report of Dairymen's Association, 96 pages, 1896.
- No. 10.* Prepared Food for Invalids and Infants, 12 pages, 1896.
- No. 11.* Tabulated Analyses of Commercial Fertilizers, 22 pages, 1896.
- No. 12.* Road Laws for Pennsylvania, 42 pages, 1896.
- No. 13.* Report of Butter Colors, 8 pages, 1896.
- No. 14.* Farmers' Institutes in Pennsylvania, 92 pages, 1896.
- No. 15. Good Roads for Pennsylvania, 42 pages, 1896.
- No. 16.* Dairy Feeding as Practiced in Pennsylvania, 126 pages, 1896.
- No. 17.* Diseases and Enemies of Poultry, 128 pages, 1896.
- No. 18.* Digest of the General and Special Road Laws for Pennsylvania, 130 pages, 1896.
- No. 19.* Tabulated Analyses of Commercial Fertilizers, 40 pages, 1896.
- No. 20.* Preliminary Report of Secretary, 126 pages, 1896.
- No. 21. The Township High School, 24 pages, 1897.
- No. 22.* Cider Vinegar of Pennsylvania, 28 pages, 1897.
- No. 23.* Tabulated Analyses of Commercial Fertilizers, 31 pages, 1897.
- No. 24.* Pure Food and Dairy Laws of Pennsylvania, 19 pages, 1897.
- No. 25.* Farmers' Institutes in Pennsylvania, 8 pages, 1897.
- No. 26.* Farmers' Institutes in Pennsylvania, 74 pages, 1897.
- No. 27. The Cultivation of American Ginseng, 23 pages, 1897.
- No. 28. The Fungous Foes of the Farmer, 19 pages, 1897.
- No. 29. Investigations in the Bark of the Tree, 17 pages, 1897.

- No. 30. Sex in Plants, 17 pages, 1897.
- No. 31. The Economic Side of the Mole, 42 pages, 1898.
- No. 32.* Pure Food and Dairy Laws, 30 pages, 1898.
- No. 33.* Tabulated Analyses of Commercial Fertilizers, 42 pages, 1898.
- No. 34.* Preliminary Report of the Secretary, 150 pages, 1898.
- No. 35. Veterinary Medicines, 23 pages, 1898.
- No. 36.* Constitutions and By-laws, 72 pages, 1898.
- No. 37.* Tabulated Analyses of Commercial Fertilizers, 40 pages, 1898.
- No. 38.* Farmers' Institutes in Pennsylvania, 8 pages, 1898.
- No. 39.* Farmers' Institutes in Pennsylvania, 88 pages, 1898.
- No. 40. Questions and Answers, 206 pages, 1898.
- No. 41.* Preliminary Reports of the Department, 189 pages, 1899.
- No. 42.* List of Creameries in Pennsylvania, 88 pages, 1899.
- No. 43. The San José Scale and other Scale Insects, 22 pages, 1899.
- No. 44.* Tabulated Analyses of Commercial Fertilizers, 62 pages, 1899.
- No. 45. Some Harmful Household Insects, 13 pages, 1899.
- No. 46. Some Insects Injurious to Wheat, 24 pages, 1899.
- No. 47. Some Insects Attacking Fruit, etc., 19 pages, 1899.
- No. 48. Common Cabbage Insects, 14 pages, 1899.
- No. 49. Method of Protecting Crops, etc., 20 pages, 1899.
- No. 50. Pure Food and Dairy Laws of Pennsylvania, 33 pages, 1899.
- No. 51.* Tabulated Analyses of Commercial Fertilizers, 69 pages, 1899.
- No. 52.* Proceedings Spring Meeting of Board of Agriculture and Managers of Farmers' Institutes, 296 pages, 1899.
- No. 53. Farmers' Institutes in Pennsylvania, 1899-1900, 94 pages, 1899.
- No. 54.* Tabulated Analyses of Commercial Fertilizers, 163 pages, 1899.
- No. 55. The Composition and Use of Fertilizers, 126 pages, 1899.
- No. 56. Nursery Fumigation and the Construction and Management of the Fumigating House, 24 pages, 1899.
- No. 57. The Application of Acetylene Illumination to Country Homes, 85 pages, 1899.
- No. 58. The Chemical Study of the Apple and Its Products, 44 pages, 1899.
- No. 59. Fungous Foes of Vegetable Fruits, 39 pages, 1899.
- No. 60.* List of Creameries in Pennsylvania, 33 pages, 1899.
- No. 61. The Use of Lime on Pennsylvania Soils, 170 pages, 1900.

*NOTE—Edition exhausted.

No. 62. A Summer's Work Abroad in School Grounds, Home Grounds, Play Grounds, Parks and Forests, 34 pages, 1900.

No. 63. A Course in Nature Study for Use in the Public Schools, 119 pages, 1900.

No. 64. Nature Study Reference Library for Use in the Public Schools, 22 pages, 1900.

No. 65. Farmers' Library List, 29 pages, 1900.

No. 66. Pennsylvania Road Statistics, 98 pages, 1900.

No. 67. Methods of Steer Feeding, 14 pages, 1900.

No. 68. Farmers' Institutes in Pennsylvania, 90 pages, 1900.

No. 69. Road Making Materials of Pennsylvania, 104 pages, 1900.

No. 70. Tabulated Analyses of Commercial Fertilizers, 97 pages, 1900.

No. 71. Consolidation of Country Schools and the Transportation of the Scholars by Use of Vans, 89 pages, 1900.

No. 72. Tabulated Analyses of Commercial Fertilizers, 170 pages, 1900.

No. 73. Synopsis of the Tax Laws of Pennsylvania, 132 pages, 1901.

No. 74. The Repression of Tuberculosis of Cattle by Sanitation, 24 pages, 1901.

No. 75. Tuberculosis of Cattle, and the Pennsylvania Plan for its Repression, 262 pages, 1901.

No. 76. A Co-operative Investigation into the Agricultural Seed Supply of Pennsylvania, 50 pages, 1901.

No. 77. Bee Culture, 101 pages, 1901.

No. 78. List of County and Local Agricultural Societies, 10 pages, 1901.

No. 79. Rabies, 28 pages, 1901.

No. 80. Decisions of the Department of Agriculture on the Pure Food Act of 1895, 20 pages, 1901.

No. 81. Concentrated Commercial Feeding Stuffs in Pennsylvania, 136 pages, 1901.

No. 82. Containing the Law Creating a Department of Agriculture in Pennsylvania, and Giving the Various Acts of Assembly Committed to the Department for Enforcement; Together with Decisions and Standards Adopted with Reference to the Pure Food Act of 1895, 90 pages, 1901.

No. 83. Tabulated Analyses of Commercial Fertilizers, 132 pages, 1901.

No. 84. Methods of Steer Feeding, the Second Year of Co-operative Experiment by the Pennsylvania State Department of Agriculture and the Pennsylvania State College Agricultural Experiment Station, 16 pages, 1901.

No. 85. Farmers' Institutes of Pennsylvania, 102 pages, 1901.

No. 86. Containing a Complete List of Licenses granted by the Dairy and Food Commissioner, from January 1, 1901. to June 30, 1901, etc., 422 pages, 1901.

No. 87. Giving Average Composition of Feeding Stuffs, 42 pages, 1901.

No. 88. List of Creameries in Pennsylvania, 33 pages, 1901.

No. 89.* Tabulated Analyses of Commercial Fertilizers, 195 pages, 1901.

THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

OFFICERS AND COMMITTEES FOR 1902.

PRESIDENT.

Hiram Young, York.

FIRST VICE PRESIDENT.

C. H. Bergner Harrisburg.

VICE PRESIDENTS.

1. Theo. Voorhees,Philadelphia.
2. William H. Wanamaker,Philadelphia.
3. Benjamin S. Kunkle,Philadelphia.
4. Charles E. Voorhees,Philadelphia.
5. A. J. Cassatt,Philadelphia.
6. David Y. Wilson,Gum Tree.
7. Robert E. Pattison,Philadelphia.
8. William T. Hildrup,Analomink.
9. George D. Stitzel,Reading.
10. Amos H. Mylin,Lancaster.
11. A. P. Young,Millville.
12. H. H. Colvin,Dalton.
13. A. D. Hay,Pottsville.
14. C. H. Bergner,Harrisburg.
15. Louis Piolet,Wysox.
16. Joel A. Herr,Cedar Springs.
17. Samuel Berkinbine,Northumberland.
18. Henry H. Chisolm,Huntingdon.
19. N. B. Critchfield,Critchfield.
20. Geo. F. Huff,Pittsburg.
21. Joseph Speer,Pittsburg.
22. J. D. Kirkpatrick,North Liberty.
23. J. C. Thornton,Fairview.
24. William Powell,Springboro.
25. Harry Hayward,State College.
26. Daniel H. Hastings,Belleville.
27. Jos. C. Sibley,Meadville.
28. Chas. A. Stone,Warren.

AT LARGE.

- William A. Stone,Harrisburg.
John Hamilton,State College.

ADDITIONAL MEMBERS EXECUTIVE COMMITTEE.

Levi G. McCauley, West Chester.
 Thos. W. Rutherford, Harrisburg.
 Thos. M. Jones, Harrisburg.
 S. F. Barber, Harrisburg.
 J. P. Nissley, Hummelstown.

CORRESPONDING AND RECORDING SECRETARY.

J. P. Nissley, Hummelstown.

TREASURER.

W. F. Rutherford, Harrisburg.

CHEMIST AND GEOLOGIST.

Hugh Hamilton, Harrisburg.

LIBRARIAN.

Wm. A. Kelker, Harrisburg.

COMMITTEE OF ARRANGEMENTS.

Hiram Young, York.
 J. P. Nissley, Hummelstown.
 D. Y. Willson, Gutn Tree.
 W. F. Rutherford, Harrisburg.
 C. H. Bergner, Harrisburg.

COMMITTEE ON LEGISLATION.

Chas. E. Voorhees, Philadelphia.
 C. H. Bergner, Harrisburg.
 Levi G. McCauley, West Chester.
 T. M. Jones, Harrisburg.
 J. P. Nissley, Hummelstown.

COMMITTEE ON LOCATION.

Hiram Young, York.
 J. P. Nissley, Hummelstown.
 C. H. Bergner, Harrisburg.
 S. F. Barber, Harrisburg.
 W. F. Rutherford, Harrisburg.

ACT TO INCORPORATE THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

Through the efforts of a number of prominent men of Pennsylvania in the year 1851, the following statute was passed by the law-making power of the State:

An Act to incorporate The Pennsylvania State Agricultural Society.

Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That George W. Woodward, James Irvin, E. A. Thompson, Frederick Watts, T. J. Bingham and others, who have subscribed the constitution lately adopted by a convention assembled at Harrisburg, to improve the condition of agriculture, horticulture and the household arts, be and they are hereby created a body politic and corporate in law by the name of "The Pennsylvania State Agricultural Society," and by that name shall have perpetual succession, and have capacity to sue and to be sued, and may have a common seal, which at their pleasure may alter or renew; they may take by gift, grant, devise, bequest or otherwise, lands and tenements, goods and chattels, necessary for all the purposes for which the society was instituted: Provided, The annual income therefrom shall not exceed ten thousand dollars, independent of annual contributions by members, and the same to convey, lay out, apply and dispose of, for the benefit of the said society, as they under their charter and by-laws may direct.

Section 2. That the members of the said corporation shall have power to make and enforce such constitution and by-laws as may be necessary for the good government of the society, and the same from time to time to revoke, alter and amend, as they may think proper: Provided, That the same shall not be inconsistent with the Constitution and laws of this State.

Section 3. That the sum of two thousand dollars out of any money in the treasury not otherwise appropriated, be and the same is hereby appropriated to the said society; and annually thereafter a sum of equal amount to that paid by the members thereof into its treasury, affidavit of which fact, and the amount so raised by the treasurer of the society, being first filed with the State Treasurer: Provided, such sum shall not exceed two thousand dollars in any one year.

Section 4. That when any number of individuals shall organize themselves into an agricultural or horticultural society, or any agricultural or horticultural society now organized within any of the counties of this Commonwealth shall have adopted a constitution and by-laws for their government, elected their officers, and raised annually, by the voluntary contributions of its members, any sum of money, which shall have been actually paid into their treasury, for the purpose of being disbursed for the promotion of agricultural knowledge and improvement, and that fact be attested by the affidavit of their president and treasurer, filed with the commissioner of the county, the said society shall be entitled to receive annually a like sum from the treasurer of their said county: Provided, That said annual payment out of the county funds shall not exceed one hundred dollars: Provided further, That but one such society in any county shall be entitled to receive such appropriation in any one year, under this act.

Section 5. That the president of The Pennsylvania State Agricultural Society, who shall receive or expend any of the moneys hereby appropriated, shall annually, on the first Monday of January, transmit to the Governor of the Commonwealth a detailed account of the expenditures of all the moneys which shall come into his hands under this act, and stating to whom and for what purpose paid; and a copy of the said report shall be transmitted to the legislature at as early a day as practicable, and the original shall be filed in the office of the Secretary of the Commonwealth. And the presidents of the several county agricultural societies shall annually transmit, in the month of December, to the executive committee of The Pennsylvania State Agricultural Society, all such reports or returns as they are required to demand and receive from applicants for premiums, together with an abstract of their proceedings during the year. This act shall at all times be within the power of the Legislature to modify, alter or repeal the same.

JOHN CESSNA,

Speaker of the House of Representatives.

BENJAMIN MATTHIAS,

Speaker of the Senate.

Approved—The twenty-ninth day of March, Anno Domini one thousand eight hundred and fifty-one.

WM. F. JOHNSON.

CONSTITUTION AND BY-LAWS OF THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

Subsequently a constitution and by-laws were adopted by the Society, and from time to time amended until they are as follows:

NAME AND OBJECTS.

The name of the society shall be The Pennsylvania State Agricultural Society. The objects of this society are to foster and improve agriculture, horticulture, and the domestic and household arts.

WHO ARE MEMBERS.

Section 1. The society shall consist of all such persons as shall pay to the treasurer not less than two dollars, and annually thereafter not less than two dollars; and also, of honorary and corresponding members, the names of the members to be recorded by the secretary.

The officers of the county agricultural societies in this State, or delegations therefrom, shall be members ex-officio of this society.

The payment of twenty-five dollars shall constitute life membership, and exempt the members so contributing from all annual payments.

OFFICERS.

Section 2. The officers of this society shall be president, vice president from each congressional district, three-fourths of whom shall be practical agriculturists or horticulturists, a treasurer, a corresponding secretary, a recording secretary, a librarian, an agricultural chemist and geologist, and such assistants as the society may find essential to the transaction of its business; an executive committee, consisting of the above-named officers, and five additional members, with the ex-presidents of the society, all of whom shall be elected at the annual meeting in January by the qualified members of the society.

OF THE PRESIDENT.

Section 3. The president shall have a general superintendence of all the affairs of the society.

FIRST VICE PRESIDENT.

That at the annual election of this society there shall be elected from one of the number of vice presidents, one of said officers to act

as first vice president, whose duty it shall be to act as president in case of absence or the death of the president.

EX-PRESIDENTS.

That whenever the number of ex-presidents exceeds five (5), the name receiving the lowest number of votes shall be the one dropped from the list of officers.

OF THE VICE PRESIDENTS.

It shall be the duty of the vice presidents to take charge of the affairs of the association in their several districts; to advance all its objects; to call upon farmers to report as to the condition of agriculture in their neighborhood; to ask for information as to the modes of cultivation adopted by different farmers; and, as far as in their power, to make known the resources of their districts, the nature of its soil, its geological character, and all such matter as may interest farmers in every part of the State.

TREASURER.

The treasurer shall keep an account of all moneys paid into his hands, and shall pay bills when audited and approved by the executive committee. Each order for payment must be signed by the president or chairman of the executive committee.

CORRESPONDING SECRETARY.

The duty of this officer shall be to invite a correspondence with all persons interested in agriculture, whether in the State of Pennsylvania or elsewhere, but especially with our consuls in foreign countries, that new seeds, vegetables, or live stock may be introduced and their fitness for cultivation and propagation in our climate be tested. At each stated meeting of the society, he shall read his correspondence, which shall, either the whole, or such parts as may be elected by the society, form a portion of the transactions. He shall also correspond with the president or other officers of each State society in the United States, at least twice in the year, for the purpose of combined and mutual action, and to be informed of the results and progress of each other's efforts; also, to invite mechanics to forward models of implements for examination or trial.

RECORDING SECRETARY.

The recording secretary shall keep the minutes of the society and of the executive committee. At the close of each year he shall prepare for publication such parts of the minutes and transactions of the society as may be designated.

The recording secretary shall have power to approve of such bills and contracts as he is authorized to make, and the treasurer shall pay the same.

LIBRARIAN.

The librarian shall take charge of all books, pamphlets, etc., belonging to the society, and shall act as a curator to preserve seeds, implements, or whatever property the society may possess.

In case of the death of any of the officers of this society, the president shall have power to fill the vacancy by appointment until the next annual meeting of the society.

EXECUTIVE COMMITTEE AND QUORUM.

The executive committee shall transact the business of the society generally; shall superintend and direct the publication of such of the reports and transactions as they may deem proper, and shall designate the time and places for annual exhibitions, regulate the expenditures, examine all accounts, and keep such general charge of the affairs of the society as may best promote its interests.

They shall select their own chairman, and meet quarterly, and at any other time when convened by the president; five members shall form a quorum.

They shall call special meetings of the society when necessary.

ANNUAL MEETING OF THE SOCIETY AND QUORUM.

Section 4. The society shall meet annually, on the third Wednesday of January, at Harrisburg, when all the officers of the society, not otherwise appointed, shall be elected by ballot for the ensuing year, and until another election. The polls shall be opened at 10 A. M. and closed at 12 o'clock M., when the result of the election shall be announced. They shall also hold a general meeting at the time of the annual exhibitions, and special meetings whenever convened by the executive committee.

Fifteen members shall form a quorum for the transaction of business, but no member in arrears shall be entitled to the privileges of the society.

QUALIFICATIONS OF VOTERS.

Section 5. No annual member hereafter shall be entitled to vote for the election of officers of The Pennsylvania State Agricultural Society unless he shall have been a member of the previous State fair, and in default of a State fair, then three months' previous membership shall be necessary.

Section 6. No one shall be eligible to office hereafter who has not obtained a right to vote under section five.

ALTERATIONS.

Section 7. This constitution may be altered or amended at the annual meetings in January by a vote of two-thirds of the members in attendance.

All amendments to the constitution, to be voted upon at the annual meeting of the society in January, must be submitted to the meeting of the executive committee in September preceding said annual meeting of the executive committee in September preceding said annual meeting.

As will be noted by the foregoing act of Assembly, constitution and by-laws, the Pennsylvania State Agricultural Society is not a stock company, and has no stockholders. Any person, on the payment of \$2, is an annual member, and any person paying \$25 at one time, immediately becomes a life member.



MEMBERS

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE

FOR THE YEAR 1902.

MEMBERS EX-OFFICIO.

HON. WM. A. STONE, Governor.
 GENERAL J. W. LATTA, Secretary of Internal Affairs.
 DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
 DR. G. W. ATHERTON, President of the State College.
 HON. E. B. HARDENBERGH, Auditor General.
 PROF. JOHN HAMILTON Secretary of Agriculture.

APPOINTED BY THE GOVERNOR.

Hon. H. A. Gripp, Tyrone, Blair County,Term expires 1901
 R. I. Young, Middletown, Dauphin County,Term expires 1902
 Col. R. H. Thomas, Mechanicsburg, Cumberland County,Term expires 1903

APPOINTED BY THE STATE POULTRY ASSOCIATION.

Hon. Norris G. Temple, Pocopson, Pa.

ELECTED BY COUNTY AGRICULTURAL SOCIETIES.

	Term expires.
Adams, A. I. Weidner, Arendtsville,	1903
Allegheny, J. S. Burns, Clinton,	1903
Armstrong, S. S. Blyholder, Leechburg	1905
Beaver, A. L. McKibben, New Sheffield	1905
Bedford, W. C. Lutz, Bedford,	1903
Berks, H. G. McGowan, Geiger's Mills,	1904
Blair, F. Jaekel, Hollidaysburg,	1904
Bradford, L. Piollet, Wysox,	1904
Bucks,	1902
Butler, W. H. H. Riddle, Butler,	1903
Cambria, H. J. Krumenacher, .. Nicktown,	1903
Cameron, W. H. Howard, Emporium,	1903
Carbon,	
Centre, John A. Woodward, .. Howard,	1903

	Term expires.
Chester, M. E. Conard, Westgrove,	1903
Clarion, S. X. McClellan, Knox,	1904
Clearfield, J. W. Nelson, Shawmut,	1903
Clinton, J. A. Herr, Cedar Springs,	1905
Columbia, H. V. White, Bloomsburg,	1903
Crawford, M. W. Oliver, Conneautville,	1904
Cumberland, C. H. Mullin, Mount Holly Springs,	1903
Dauphin, S. F. Barber, Harrisburg,	1903
Delaware, J. Milton Lutz, Llanerch,	1904
Elk, Frank Simpson, Ridgway,	1903
Erie, H. H. Chaffee, Lowville,	1904
Fayette, J. M. Hantz, Merrittstown,	1903
Forest, C. A. Randall, Tionesta,	1904
Franklin, C. B. Hege, Marion,	1905
Fulton, R. M. Kendall, McConnellsburg,	1904
Greene, B. F. Herrington, Waynesburg,	1904
Huntingdon, G. G. Hutchison, Warrior's Mark,	1903
Indiana, S. M. McHenry, Indiana,	1904
Jefferson, Chas. G. McClain, Ringgold,	1905
Juniata, M. Rodgers, Mexico,	1903
Lackawanna, H. W. Northup, Glenburn,	1903
Lancaster, W. H. Brosius, Fernglen,	1904
Lawrence, Samuel McCreary, Neshannock Falls,	1903
Lebanon, H. C. Snively, Lebanon,	1904
Lehigh, J. L. Schreiber, Hosensack,	1903
Luzerne,	
Lycoming, A. J. Kahler, Hughesville,	1903
McKean, Chas. N. Barrett, Port Allegany,	1903
Mercer, S. A. Williams, Volant, No. 4 R. D.,	1905
Mifflin, D. E. Notestine, Lewistown,	1904
Monroe,	
Montgomery, J. Sexton, North Wales,	1905
Montour, J. K. Murray, Pottsgrove,	1904
Northampton, Wm. F. Beck, Nazareth,	1903
Northumberland, J. A. Eshbach, Milton,	1905
Perry, A. T. Holman, Nekoda,	1904
Philadelphia, E. Lonsdale, Wyndmoor,	1904
Pike,	
Potter,	
Schuylkill, W. H. Stout, Pinegrove,	1903
Snyder, J. F. Boyer, Mount Pleasant Mills,	1906
Somerset, N. B. Critchfield, Critchfield,	1904
Sullivan, J. W. Rodgers, Forksville,	1903
Susquehanna, C. W. Brodhead, Montrose,	1904
Tioga, F. E. Field, Stonyfork,	1905
Union, J. Newton Glover, Vicksburg,	1905
Venango, August Morek, Oil City,	1904
Warren, R. J. Weld, Sugargrove,	1904
Washington, D. M. Pry, Burgettstown,	1905
Wayne, Warren E. Perham, Niagara,	1904
Westmoreland, M. N. Clark, Claridge,	1904
Wyoming, D. A. Knuppenburg, Lake Carey,	1904
York, B. F. Kohler, Shrewsbury,	1904

OFFICERS.

PRESIDENT.

Hon. William A. Stone, Governor, Harrisburg.

VICE PRESIDENTS.

H. V. White, Bloomsburg.

W. F. Beck, Nazareth.

Joel A. Herr, Cedar Springs.

EXECUTIVE COMMITTEE.

Hon. W. A. Stone, Harrisburg.

M. N. Clark, Claridge.

A. J. Kahler, Hughesville.

H. G. McGowan, Geiger's Mills.

H. C. Snively, Lebanon.

W. H. Stout, Pinegrove.

Matthew Rodgers, Mexico.

Jason Sexton, North Wales.

John Hamilton, *Secretary*, Harrisburg.

ADVISORY COMMITTEE.

John Hamilton, *Secretary*, Harrisburg.

M. N. Clark, Claridge.

H. G. McGowan, Geiger's Mills.

A. J. Kahler, Hughesville.

Botanist, Prof. W. A. Buckhout, State College.

Pomologist, Cyrus T. Fox, Reading.

Chemist, Dr. William Frear, State College.

Vet. Surgeon, Dr. Leonard Pearson, Philadelphia.

Sanitarian, Dr. Benjamin Lee, Philadelphia.

Microscopists and Hygenists, Dr. H. Leffman, Philadelphia.
 [Prof. C. B. Cochran, West Chester.

Entomologists, Prof. R. C. Scheldt, Lancaster.

Dr. H. Skinner, Philadelphia.

Ornithologist, Prof. H. A. Surface, State College.

Meteorologists, E. R. Demain, Harrisburg.

J. L. Heacock, Quakertown.

Mineralogist, Col. H. C. Demming, Harrisburg.

Aplarist, Prof. Geo. C. Butz, State College.

Geologist, Dr. M. E. Wadsworth, State College.

STANDING COMMITTEES.

LEGISLATION.

Jason Sexton, Chairman, North Wales.
A. J. Kahler, Hughesville.
G. G. Hutchison, Warrior's Mark.
Lewis Piolet, Wysox.
M. E. Conard, Westgrove.

CEREALS AND CEREAL CROPS.

A. I. Weidner, Chairman, Arendtsville.

ROADS AND ROAD LAWS.

H. C. Snively, Chairman, Lebanon.

FRUIT AND FRUIT CULTURE.

Enos B. Engle, Chairman, Waynesboro.

DAIRY AND DAIRY PRODUCTS.

S. F. Barber, Chairman, Harrisburg.

FERTILIZERS.

Matthew Rodgers, Chairman, Mexico.

WOOL AND TEXTILE FIBRES.

Samuel McCreary, Chairman, Neshannock Falls.

LIVE STOCK.

M. E. Conard, Chairman, Westgrove.

POULTRY.

Norris G. Temple, Chairman, Pocopson.

FORESTS AND FORESTRY.

Dr. J. T. Rothrock, Chairman, Harrisburg.

APIARY.

Prof. Geo. C. Butz, Chairman, State College.

FLORICULTURE.

Edwin Lonsdale, Chairman, Wyndmoor.

AN ACT ESTABLISHING THE STATE BOARD OF AGRICULTURE.

AN ACT

To Establish a State Board of Agriculture.

Section 1. Be it enacted, etc., That the Governor of the Commonwealth, the Secretary of Internal Affairs, the Superintendent of Public Instruction, the Auditor General, the President of the Pennsylvania State College, and one person appointed from or by each agricultural society in the State, entitled under existing laws to receive an annual bounty from the county, and three other persons appointed by the Governor, with the consent of the Senate, shall constitute the State Board of Agriculture.*

Section 2. One-third of the members appointed shall retire from office on the fourth Wednesday in January in each year, according to their several appointments. The vacancies thus occurring shall be filled in the same manner as above provided, and the persons thus appointed shall hold their office for three years from the expiration of the former term. Other vacancies may be filled in the same manner, for the remainder of the vacant term.

Section 3. The board shall meet at the capital of the State, at least once in each year, and as much oftener as may be deemed expedient. No member of said board shall receive compensation from the State, except for necessary personal expenses, when engaged in the duties of the board.

Section 4. They shall appoint, and prescribe the duties of a secretary of the board, who may receive a salary, not exceeding fifteen hundred dollars a year.

*Note.—Extracts from the law.

"That when any number of individuals shall organize themselves into an agricultural or horticultural society, or any agricultural or horticultural society now organized within any of the counties of this Commonwealth, shall have adopted a constitution and by-laws for their government, elected their officers, and raised annually, by the voluntary contributions of its members any sum of money which shall have been actually paid into their treasury, for the purpose of being disbursed for the promotion of agricultural knowledge and improvement, and that fact be attested by the affidavit of their president and treasurer, filed with the commissioners of the county, the said county society shall be entitled to receive annually a like sum from the treasurer of their said county: Provided, That said annual payment out of the county funds shall not exceed one hundred dollars: Provided further, That but one such society in any county, shall be entitled to receive such appropriation in any one year, under this act."—Section 4, Act No. 203, 1851.

"That there shall be but one member of the Board from any county in the State. That any county asking for representation in the Board must have an agricultural society which shall raise a sum of money each and every year, for the advancement of agriculture, so as to be entitled to an annual bounty on the conditions prescribed in the acts of 1851 and 1876."—From Rules of the Board.

Section 5. They shall investigate such subjects relating to improvements in agriculture in the State, as they may find proper, and take, hold in trust, and exercise control over, donations or bequests made to them for the promotion of agricultural and general interest of husbandry.

Section 6. They may prescribe forms for, and regulate returns from local agricultural societies, and furnish to the officers of each such blanks as they deem necessary to secure uniform and reliable statistics.

Section 7. They shall annually, on or before the fourth day of January in each year, by their president or secretary, submit to the General Assembly, a detailed report of their doings, with such recommendations and suggestions as the interests of agriculture may require.

Section 8. The secretary of the board shall, in each year, cause to be made and published, for distribution, as full an abstract of the returns from local societies as the board may deem useful.

Section 9. The secretary shall have a permanent office at the capital, under the control and supervision of the board, which shall be supplied and maintained at the expense of the State.

This act shall take effect on the fourth Wednesday of January next ensuing.

Approved—The 8th day of May, A. D. 1876.

JOHN F. HARTRANFT.

CERTIFICATE OF ELECTION TO MEMBERSHIP IN THE
STATE BOARD OF AGRICULTURE.

..... 190..
Office of the Agricultural Society.
..... County, Pa.

This will certify, That
of County of was this day
..... to represent this Society in the Pennsylvania State
Board of Agriculture, for the term of three years, commencing from
and on the fourth Wednesday of January, 190.; and that the said

Society was organized under, and has complied with the acts of Assembly and rules of the Board of Agriculture, as above set forth.

.....,
(SEAL) President.

P. O. Address,

Attest:

.....
Secretary.

P. O. Address,

MINUTES OF THE MEETING OF THE STATE BOARD OF AGRICULTURE.

HELD IN THE SUPREME COURT ROOM, IN HARRISBURG, JANUARY
23 AND 24, 1901.

Wednesday, January 23, 1901, 10 A. M.

The Board met in the Supreme Court Room, in the city of Harrisburg, at 10 A. M., January 23, 1901.

In the absence of the President and Vice Presidents, the meeting was called to order by the Secretary.

On motion, the Hon. Samuel R. Downing was elected to preside.

The following persons were appointed by the chairman a committee to wait upon the Governor and inform him that the Board is in session and to invite him to be present. The committee was composed of Messrs. Riddle, Conard and Weld.

The roll was then called and the following persons answered to their names: R. H. Thomas, Norris G. Temple, A. I. Weidner, W. H. H. Riddle, M. E. Conard, Joel A. Herr, H. V. White, C. H. Mullin, C. B. Hege, J. Newton Kelly, Matthew Rodgers, H. W. Northup, Samuel McCreary, J. L. Schreiber, A. J. Kahler, R. F. Schwarz, Jason Sexton, Wm. F. Beck, W. H. Stout and John W. Rodgers.

The minutes of the last meeting were then read and approved.

On motion, the following members were appointed a committee on credentials: Joel A. Herr, Matthew Rodgers, H. V. White, H. W. Northup and A. J. Kahler.

Mr. Riddle, the chairman of the committee appointed to wait upon the Governor, reported that they had an interview with His Excellency, and that he would be present at some time during the morning session.

The reports of standing committees being called for, the following committees presented their reports:

The report of the Committee on Cereals and Cereal Crops was presented by A. I. Weidner, chairman (see paper A). After discussion by Mr. McCreary the report, on motion, was received and ordered on file.

Hon. Jason Sexton presented the report of the Legislative Committee (see paper B). The report was received and ordered on file.

The Committee on Fruit and Fruit Culture was called for, and there being no response, the chairman called for the report on Dairy

and Dairy Products. It was stated that Mr. Barber, the chairman, had been called away and would present the report and file it with the Secretary later.

The Committee on Wool and Textile Fibres reported, through its chairman, Hon. Hiram Young (see paper C). Discussion followed, by Messrs. Edge and Sexton. The report was then received and ordered on file.

The Committee on Live Stock reported, through its chairman, Dr. M. E. Conard (see paper D). The report was accepted and ordered on file.

The report of the Committee on Credentials was then presented. The credentials of the following persons were found in order, and the committee recommended that they be admitted to membership in the Board:

Frederick Jaekel,	Blair county,	1904
Howard G. McGowan,	Berks county,	1904
Louis Piolet,	Bradford county,	1904
S. N. McClellan,	Clarion county,	1904
R. M. Kendall,	Fulton county,	1901
B. F. Herrington,	Greene county,	1904
S. M. McHenry,	Indiana county,	1904
Hon. Wm. H. Brosius,	Lancaster county,	1904
H. C. Snively,	Lebanon county,	1904
J. K. Murray,	Montour county,	1904
A. T. Holman,	Perry county,	1904
C. W. Brodhead,	Susquehanna county,	1904
Warren E. Perham,	Wayne county,	1904
R. J. Weld,	Warren county,	1904
M. N. Clark,	Westmoreland county,	1904
D. A. Knuppenberg,	Wyoming county,	1904
Dr. August Morck,	Venango county,	1904
Edwin Lonsdale,	Philadelphia county,	1904
D. E. Notestine,	Mifflin county,	1904

On motion of Mr. Herr, the persons above named were duly admitted to membership of the Board.

The following persons, holding credentials from agricultural organizations, were admitted to the floor as advisory members:

Name.	Representing.
W. M. Benninger,	Pennsylvania State Fair Association.
Hon. Geo. D. Stitzel,	Agricultural and Horticultural Association of Berks County.
Cyrus T. Fox,	Agricultural and Horticultural Association of Berks County.
Hon. E. S. Hoover,	Agricultural and Horticultural Association of Lancaster County.
T. C. Corson,	Canasatego Grange No. 27.
Hiram Young,	Pennsylvania State Agricultural Society.
W. F. Rutherford,	Pennsylvania State Agricultural Society.

Name.	Representing.
J. P. Nissley,	Pennsylvania State Agricultural Society.
Dr. S. P. Heilman,	Mt. Gretna Agricultural and Mechanical Association.
Hon. T. K. Beaver,	Juniata County Agricultural Society.
John Adams,	Juniata County Agricultural Society.
Stuart A. Robinson,	Juniata County Agricultural Society.
W. H. Moon,	State Horticultural Association.
W. H. Stout,	State Horticultural Association.
J. E. Jamlson,	State Horticultural Association.
E. W. Thomas,	State Horticultural Association.
D. D. Herr,	State Horticultural Association.
Ira Bishop,	Potter County Alliance.
J. C. Sharpless,	State Dairy Union.
H. W. Comfort,	State Dairy Union.
L. D. May,	State Dairy Union.
S. F. Barber,	State Dairy Union.
C. L. Peck,	State Dairy Union.

The arrival of the President of the Board, Governor Stone, was then announced, and he was escorted to the chair. After a short address, in which he called attention to the high character of the agricultural people of the State and their influential position in its government, he took up the oleomargarine question, as well as that of food in general, and expressed his desire to co-operate in the enforcement of all pure food laws. He recommended the passage of the Grout bill before Congress, and ended by stating that we are more concerned in the purity of the things we eat than in any other article of our commerce. The Governor then excused himself from further attendance upon the meetings of the Board, because of the many duties that required his attention just now in his office, the Legislature being in session, and many important measures being on hand requiring careful consideration.

The Board adjourned to meet at 2 P. M.

Wednesday, January 23, 2 P. M.

The Board met, pursuant to adjournment, Hon. S. R. Downing in the chair.

The reading of reports of standing committees was resumed, and Mr. Norris G. Temple presented the report of the Poultry Committee. On motion, the report was adopted and ordered on file (see paper E).

Dr. J. T. Rothrock, Commissioner of Forestry, reported for the Committee on Forests and Forestry. The report was received and ordered on file (see paper F).

The Board then proceeded to the election of officers. Dr. M. E. Conard, C. W. Brodhead and R. J. Weld were nominated for Vice Presidents. On motion, Mr. H. V. White was directed to cast the ballot for the gentlemen named, which he did, and they were declared elected.

The Board then proceeded to the election of an Executive Committee. The following gentlemen were named: Hon. W. A. Stone, A. J. Kahler, H. G. McGowan, H. C. Snavely, Hon. Jason Sexton, W. H. Stout, M. N. Clark, Wm. F. Beck and John Hamilton, Secretary. On motion, Mr. Louis Piolet was directed to cast the ballot of the Board for the gentlemen named, after which they were duly declared elected.

The reading of the reports of standing committees was then resumed.

Mr. Matthew Rodgers, of Juniata county, presented the report of the Committee on Fertilizers. The report was, on motion, received and ordered on file (see paper G).

The newly elected Vice President, Dr. Conard, was at this point invited by the temporary presiding officer to occupy the chair.

The Committee on Floriculture reported, through its chairman, Mr. Edwin Lonsdale. The report was, on motion, received and ordered on file (see paper H).

Hon. S. R. Downing reported for the Committee on Roads and Road Laws. The report was, on motion, received and ordered on file (see paper I).

The reading of the reports of standing committees having been concluded, the subject of "New Business" was taken up. The place of the next meeting was declared to be first in order.

Secretary Hamilton invited the Board to come to the State College for their Spring Meeting. Col. Woodward and Mr. Fox seconded the invitation on behalf of the trustees of the State College. On motion, the invitation was accepted.

The Pomologist of the Board, Mr. Cyrus T. Fox, then presented his report. On motion, the report was received and ordered on file (see paper K).

The regular programme of the afternoon session was then taken up.

The first paper presented was by D. A. Knuppenburg, subject "Qualifications Essential to the Successful Farmer" (see paper L).

The next paper was by W. H. H. Riddle, entitled "Running in the Rut" (see paper M).

H. V. White, Esq., then presented a paper, subject, "Success; What Is It?" (see paper N).

After discussion, participated in by Messrs. Stout, Beaver, White,

Herr, Hamilton, Kahler, Sexton, Edge and Schreiber; the papers were all received and ordered on file.

On motion of Mr. S. M. McHenry, the following resolution was adopted:

"Resolved, That we heartily endorse the very able report of our Legislative Committee, and hereby instruct the Legislative Committee, when appointed, to prepare a bill or bills, embodying the recommendations therein set forth, and have it introduced at the present session of the Legislature, and to use all honorable means in their power to have it enacted into law."

Mr. Comfort, of the Dairy Union, spoke on the question of enlarged membership.

On motion, adjourned to meet at 7.30 P. M.

Wednesday, January 23, 7.30 P. M.

The Board met, pursuant to adjournment.

The Question Box was opened and various questions therein were read and discussed by Messrs. Rothrock, Edge and Rodgers.

The Executive Committee presented its report through its chairman, Mr. A. J. Kahler (see paper P) as follows:

ADVISORY COMMITTEE.

John Hamilton, Secretary, Harrisburg.
M. N. Clark, Chairman, Claridge.
H. G. McGowan, Geiger's Mills.
Wm. F. Beck, Nazareth.

STANDING COMMITTEES.

Legislation.

Jason Sexton, Chairman, North Wales.
A. J. Kahler, Hughesville.
G. G. Hutchison, Warrior's Mark.
Lewis Piolet, Wysox.
M. E. Conard, Westgrove.

Cereals and Cereal Crops.

A. I. Weidner, Chairman, Arendtsville.

Roads and Road Laws.

Henry C. Snavely, Lebanon.

Fruit and Fruit Culture.

S. B. Helges, York.

Dairy and Dalry Products.

S. F. Barber, Harrisburg.

Fertilizers.

Matthew Rodgers, Chairman, Mexico.

Wool and Textile Fibres.

Samuel McCreary, Neshannock Falls.

Live Stock.

M. E. Conard, Chairman, Westgrove.

Poultry.

Norris G. Temple, Chairman, Pocopson.

Forests and Forestry.

Dr. J. T. Rothrock, Chairman, Harrisburg.

Apiary.

Prof. Geo. C. Butz, Chairman, State College.

Floriculture.

Edwin Lonsdale, Chairman, Wyndmoor.

Botanist, Thomas Meehan, Germantown.
 Pomologist, Cyrus T. Fox, Reading.
 Chemist, Dr. William Frear, State College.
 Veterinary Surgeon, Dr. Leonard Pearson, Philadelphia.
 Sanitarian, Dr. Benj. Lee, Philadelphia.
 Microscopists and Hy- Dr. H. Leffman, Philadelphia.
 gienists.

Prof. C. B. Cochran, West Chester.
 Entomologists, Prof. R. C. Scheidt, Lancaster.
 Dr. H. Skinner, Philadelphia.
 Ornithologist, Prof. W. A. Buckhout, ... State College.
 Meteorologists, E. R. Demain, Harrisburg.
 J. L. Heacock, Quakertown.
 Mineralogist, Col. H. C. Demming, Harrisburg.
 Apiarist, Prof. Geo. C. Butz, State College.
 Geologist, Prof. Isaac A. Harvey, ... Beech Creek.

On motion, the report was adopted, and the persons named were duly elected to the several positions designated.

The regular evening programme was then taken up.

Dr. H. P. Armsby, of the State Experiment Station, spoke upon the subject of "Food and Energy." Discussion followed, participated in by Messrs. Stout, McCreary and Piolet.

The next paper was by Mr. H. W. Northup, on "Some Things I Have Learned on the Farm." Discussion followed, participated in by Messrs. Hamilton, Piolet, White, Martin, Kahler, McClellan, Stout, McHenry, Herr and McCreary.

The report of the Chemist, Dr. Wm. Frear, was then read, and, on motion, received and ordered on file (see paper R).

Board adjourned until Thursday morning at 9 A. M.

Thursday, January 24, 9 A. M.

Board met, pursuant to adjournment, Vice President Conard in the chair.

The Secretary called attention to the death of Mr. D. W. Lawson, a member of the Board from Armstrong county. On motion, a committee consisting of Messrs. Herr, McCreary and Stout were appointed to prepare appropriate resolutions on the death of Mr. Lawson.

The attention of the Board was then called by the Secretary to the meeting of the Associated Health Authorities, to be held in Harrisburg, February 6 and 7; the members of this Board are invited.

The regular programme of the morning was then taken up.

The first paper was by Mr. C. W. Brodhead, on "Horse Breeding and the Care of the Teeth and Feet." Discussion followed, participated in by Messrs. Hoover, Stout, McClellan, Knuppenburg, Edge, Conard, Herr and Piolet.

The next paper was by Dr. Wm. Frear, on "Modern Cattle Foods and Cattle Food Control." Discussion followed, participated in by Messrs. Piolet, Hamilton and Edge.

Reports were then read by officers of the Board as follows:

Report of Dr. Benj. Lee, Sanitarian of the Board (see paper U).

Report of the Mineralogist, Col. H. C. Demming (see paper V).

Report of the Ornithologist, Prof. Wm. A. Buckhout (see paper W).

The following resolution was offered by Mr. Piolet:

"Resolved, That we, the members of Pennsylvania State Board of Agriculture, now assembled, do urge our United States Senators to use all honorable means to secure the passage of the Grout bill now pending in the Senate."

On motion, it was unanimously adopted.

The following resolution was presented by Mr. Piolet:

"Resolved, That we, the members of the Pennsylvania State Board of Agriculture assembled, urge the Dairy and Food Commissioner

to use every agency in his power to prevent the sale of boiled or renovated butter in this State."

The motion was seconded and unanimously adopted.

The committee on the death of Mr. D. W. Lawson, member from Armstrong county, presented the following report, which, on motion, was unanimously adopted:

"Whereas, This Board has learned with sorrow of the death of D. W. Lawson, a member from Armstrong county, who departed this life on the ——— day of ———, A. D. 1900; therefore, be it

"Resolved, That in his death this Board has lost an intelligent, earnest and active member, whose regular attendance at its meetings, when in health, evidenced his sincere interest in its work.

"Resolved, That we express our sorrow and sympathy to his family and friends in their bereavement, and that a copy of this resolution be entered upon the minutes of the Board and a copy be sent to the bereaved family."

On motion, the Board adjourned to meet at 1.30 P. M.

Thursday Afternoon, January 24, 1.30 o'clock.

Board met, pursuant to adjournment, Vice President Conard in the chair.

A verbal report by the Veterinarian of the Board, Dr. Leonard Pearson, was presented.

A paper was then read by Mr. C. B. Hege, on "How to Prepare a Seed Bed and Grow Wheat Successfully." Discussion by Mr. Hoover, of Lancaster.

The next paper was by Mr. Wm. F. Beck, subject "Why Some Farmers Prosper While Others with Similar Advantages Fail."

A paper was then read by Hon. R. F. Schwarz on "Practical Experiments in Restoring Worn-Out Farms."

The next paper was by Col. H. C. Demming on the "Fertility Problem."

A report was then presented by the Mineralogist, Col. H. C. Demming.

A report was also presented by the Entomologist, Dr. Skinner, and an additional report by the Associate Entomologist, Prof. Scheidt.

Also, a report by the Botanist, Prof. Meehan.

After general discussion on the papers presented, participated in by Messrs. Pearson, Weld, Clark, Beck, Demming, Martin, Schwarz, Rodgers, of Juniata, Clemson, Weidner, Hamilton, McClellan and Sharpless, the reports were received and ordered on file.

On motion, the Board adjourned *sine die*.

JOHN HAMILTON,

Secretary.

MINUTES OF MEETING OF THE STATE BOARD OF AGRICULTURE, HELD AT STATE COLLEGE, PA., JUNE 5 AND 6, 1901.

Wednesday, June 5, 1901, 1.30 P. M.

The Board met at 1.30 P. M. in the chapel of the State College, and was called to order by Vice President Conard. The roll of membership was called, the following persons answering to their names:

Dr. N. C. Schaeffer, Dr. G. W. Atherton, Prof. John Hamilton, H. A. Gripp, R. I. Young, Norris G. Temple, A. I. Weidner, J. S. Burns, W. C. Lutz, H. G. McGowan, W. H. H. Riddle, Dr. M. E. Conard, S. X. McClellan, Joel A. Herr, H. V. White, C. B. Hege, B. F. Herrington, G. G. Hutchison, S. M. McHenry, Matthew Rodgers, H. W. Northup, Samuel McCreary, J. L. Schreiber, A. J. Kahler, D. E. Notestine, R. F. Schwarz, Jason Sexton, J. K. Murray, Wm. F. Beck, W. H. Stout, C. W. Brodhead, D. M. Pry, W. E. Perham, M. N. Clark and D. A. Knuppenburg.

The minutes of the previous meeting were then read and, on motion, approved.

The following persons were, on motion, appointed a committee on credentials: J. A. Herr, G. G. Hutchison, H. G. McGowan, M. N. Clark and J. K. Murray.

M. N. Clark, of Westmoreland county, read a letter from W. A. Gardner, of Potter county, calling attention to the lack of representation for Potter county, and applying to the Board for recognition. The letter and subject was referred to the committee on credentials.

Dr. Geo. W. Atherton, President of the Pennsylvania State College, was then introduced. After welcoming the members of the Board and visiting delegates to the college, he delivered an address on the present conditions and purposes of the college. The chairman, Dr. Conard, responded to the address of Dr. Atherton, and expressed the gratification of the Board at the courtesies extended, and at the progress of the college in all its lines of education, especially upon the attention which is being paid to the development of the agricultural courses.

Dr. H. P. Armsby was next introduced, and invited the members of the Board and delegates to make a complete inspection of the college

dairy during their stay, and presented a map of the college grounds and buildings to each member and delegate.

The committee on credentials then reported that they had examined the credentials of the following persons for membership in the State Board and recommended that they be admitted: S. S. Blyholder (1902), Henry J. Krumenacker (1903), J. W. Nelson (1903), M. W. Oliver (1904), J. Milton Lutz (1904), Frank Simpson (1903), H. H. Chaffee (1904), J. M. Hantz (1903), C. A. Randall (1904), J. A. Eshbach (1903), N. B. Critchfield (1904) and W. H. Howard (1903).

On motion, the persons named were admitted to membership in the Board.

Mr. Hutchison moved that all visitors be admitted to the privileges of the floor. Carried.

On motion, Mr. R. J. Young, of Middletown, Pa., who was appointed by the Governor, was admitted to membership in this Board.

Secretary Hamilton reported upon the bills passed by the last Legislature in the interests of agriculture.

Dr. N. C. Schaeffer was then introduced and addressed the Board upon "The Rural Schools of Pennsylvania." The discussion which followed was participated in by Messrs. Lutz, Hutchison, Hamilton, Peck, Sexton, Herr, Edge, Kahler, Stout and McHenry.

It was moved and carried that a committee be appointed to draft a resolution to be presented to the State Legislature, asking for an appropriation to meet the expenses of the meetings of the State Board of Agriculture.

The chairman appointed on that committee, Messrs. N. G. Temple, M. N. Clark and Matthew Rodgers.

Adjourned to meet at the call of the chairman.

Wednesday, June 5, 1901, 7.30 P. M.

Board was called to order by Vice President Conard.

The committee appointed to prepare a resolution in regard to an appropriation by the State Legislature reported as follows:

To the Hon. Ward R. Bliss and the several Members of the Appropriation Committee:

Whereas, The State Board of Agriculture, in accordance with the laws of the State of Pennsylvania, are required to meet annually in Harrisburg and have been doing so for the last six years, paying their own expenses; and

Whereas, The members of the State Board have been actually engaged as chairmen of the institute work in the several counties of this Commonwealth, under the direction of the Department of Agriculture, all of which has been done without compensation:

Resolved, As members of the State Board of Agriculture, in semi-annual session held at State College, Pa., June 5, 1901, we believe our actual expenses should be paid.

Resolved, That we ask the Legislature to appropriate the sum of \$3,000, or as much thereof as may be necessary, to defray our actual expenses for the next two years.

Resolved, That we heartily endorse the action of the Legislative Committee of the State Board of Agriculture in this matter.

State College, Centre county, Pa., June 5, 1901.

(Signed.)

NORRIS G. TEMPLE,
Chairman.
M. N. CLARK.

Moved by Mr. Stout that the resolutions be returned to the committee and that the chairman of the committee be instructed to forward them to Hon. Ward R. Bliss, chairman of the Committee on Appropriations. Carried.

Col. Jno. A. Woodward was then given the floor to present to the Board the conditions of the bill prepared and presented to the Legislature, making appropriation to the State College for a dairy and forestry building. The members of the Board were urged to write to the chairman of the Committee on Agriculture urging that the committee report the bill as soon as possible for the full amount.

The Board adjourned at 8 P. M. to make way for the meeting of the Institute Managers, and to meet at the call of the President.

Thursday Afternoon, June 6, 1901.

The State Board met at 4.30 P. M. to hear the report of the committee on credentials. The committee reported that the certificate of W. H. Howard, of Cameron county, was in their hands, and, on motion, Mr. Howard was admitted.

The committee further represented that there was a contest in regard to the delegate from Centre county. Majority and minority reports were presented. The majority recommended the admission of Col. Jno. A. Woodward, elected by the Centre County Agricultural Society, and the minority, Col. Fred. Reynolds, as the repre-

sentative of the Centre County Agricultural Exhibiting Company.

It was then moved that the majority report be accepted. This was, on motion of Mr. Schwarz, amended to lay over to the meeting in July. Carried.

Mr. Oliver moved to reconsider the vote on the amendment. A division was called for and the motion was lost by a vote of 8 to 18.

Adjourned.

JOHN HAMILTON,
Secretary.

MINUTES OF THE THIRD ANNUAL MEETING OF FARMERS'
INSTITUTE MANAGERS AND LECTURERS, HELD AT STATE
COLLEGE, PA., JUNE 5, 6 AND 7, 1901.

Wednesday Evening, June 5, 1901.

The meeting was called to order at 7.30, with Howard G. McGowan, of Berks county, in the chair.

A. L. Martin, Director of Institutes, delivered the opening address, with a brief summary of the work accomplished at institutes the year past, which showed the work to be advancing in interest throughout the State.

The second topic for discussion, "Should an Institute be Held in the Country where the Hall is of Insufficient Size to Accommodate the People, or in the Adjoining Town?" was opened by Dr. M. E. Conard, of Chester county, and Joel A. Herr, of Clinton county. Dr. Conard deprecated the holding of institutes in small buildings, and recommended the procuring of churches, wherein the people could be accommodated. He regarded the country places as preferable locations for holding institutes, yet where such halls, churches or buildings could not be procured, he advised going into the towns with institutes. Mr. Herr would keep institutes in country places, even though the halls were small.

The question was discussed by Messrs. C. W. Williams, Jason Sexton and S. M. McHenry.

The third topic for discussion, "What is the Most Effective Way of Advertising our Institutes?" was opened by Mr. Samuel McCreary, of Lawrence county, and Mr. H. V. White, of Columbia county.

Mr. McCreary recommended the advertising of all institutes in county papers and the putting up of posters, etc.

Mr. White advocated the printing and distributing of postal cards, the sending of programmes to school teachers and county superintendents of schools, and enlisting the co-operation of the best farmers and people within a radius of ten miles.

The discussion was continued by Dr. Conard, who said we should have committees on organization of institutes, on programmes, question box, music and entertainment.

Fourth topic, "How Should the Time be Apportioned between the Local and State Speakers?" was opened by Hon. Jason Sexton, of Montgomery county. He said local speakers should have prominent places on programme, but State speakers should be expected to lead in the discussions. By joining the two forces together at these institutes the greatest good is accomplished. Discussion was entered into by J. Q. Atkinson, Esq., and Hon. Thos. J. Philips.

Fifth topic, "What Arrangements Should be Made for the Entertainment of Local Lecturers?" Opened by Mr. Wm. F. Beck, of Northampton county. Local help and lecturers should be entertained, and arrangements made by the county chairmen of institutes for lodging, meals, etc.; especially was it true where persons drive from a distance and take leading part in programme.

General discussion followed.

Session closed at 4.30 P. M.

Thursday Afternoon, June 6, 1901.

Meeting called to order at 1.30, Hon. W. H. Brosius, of Lancaster county, in the chair.

First topic, "The Ideal Farmers' Institute." Discussion opened by Mr. C. L. Peck, of Potter county. He said the ideal institute is one in which the best local talent is employed, one in which is discussed topics relating to agriculture, where good music is present, where the sessions begin at the appointed time, where the lecturers are not so tedious as to wear out the patience of the audience, where practical farmers give their personal experience, where ladies take charge of the Country Home Session.

Many valuable points were brought forth in the general discussion which was participated in by Messrs. George E. Hull, Thos. J. Philips, C. C. McWilliams, R. L. Watts, J. Q. Atkinson, L. A. Clinton, Watson T. Davis, M. W. Oliver and D. H. Pershing.

Second topic, "The Most Effective Mode of Presenting Agricul-

tural Information to the Average Audience." Discussion opened by Alva Agee, of Cheshire, O., and R. S. Seeds, of Huntingdon county. Some of the good points mentioned were, first, brevity on the part of an institute lecturer; second, to give personal experience and make use of plain conversational language, and always tell the truth.

Mr. Seeds remarked that a lecturer's own natural way was the best way for him.

Discussion followed, participated in by H. W. Northup, L. A. Clinton and Secretary Hamilton.

Session closed at 4.30.

Thursday Evening, June 6, 1901.

Called to order at 7.30, J. S. Burns, of Allegheny county, in the chair.

First topic, "How Can the Question Box be Managed to the Best Advantage?" Discussion was opened by C. D. Northrop, of Tioga county, and Frank Simpson, of Elk county.

Mr. Northrop said the question box should be placed in charge of a competent manager, who should be supplied with blank paper and quietly distribute same through the audience, and usually at the closing of each session the question box should be opened and the questions fully discussed.

Mr. Frank Simpson remarked that only such questions should be discussed as are developed on regular programme. The person in charge of questions should exercise discretion and care in presenting same to the institute.

Discussion followed, participated in by Messrs. Clark, Rodgers, Kahler, Sexton, Felix and Beardslee.

Second topic, "How Should the Country Home Session be Conducted, and What Should be its Leading Features?" Discussion opened by Prof. J. M. Hantz, of Fayette county, and J. Milton Lutz, of Delaware county.

Prof. Hantz said that domestic science should be made a leading feature at the country home session; also, home sanitation.

Discussion followed by Mr. Northrop, and many valuable points were brought out as to the social side of farm life.

Third topic, "What Should be the Leading Features of the Educational Session?" Opened by Hon. Thos. J. Philips, of Chester county, and W. F. McSparran, of Lancaster county.

The educational session should first embrace such studies as ought to be pursued by the farmers' family. The country school; its location; shall it be centralized or isolated; shall our children have

the opportunity of studying more of natural objects, etc., and many valuable thoughts were presented by both Mr. Philips and Mr. McSparran relative to advanced education for country children.

Adjourned at 9.30.

Friday Morning, June 7, 1901.

Called to order at 9 A. M., Mr. George G. Hutchison, of Huntingdon county, in the chair.

"Suggestions for Leading Topics for Next Year's Institutes," was the first topic. Opened by Mr. W. H. H. Riddle, of Butler county, Dr. Leonard Pearson, and L. W. Lighty, of Adams county.

Mr. Riddle recommended, first, a general farming session, devoted to soil fertility, the cultivation of crops, animal industry, horticulture, etc.; night sessions devoted to educational matters and the interests of the country home.

Dr. Pearson mentioned the importance of sanitary conditions in the barn and in the handling of live stock as an important topic for discussion at Farmers' Institutes.

Third topic, "Relation of State College to Farmers' Institutes." Mr. R. L. Watt, of Cambria county, named the importance of carrying to the farmers correct, scientific knowledge in every line of farm work. This can best be accomplished by instructors from the State College, whose lives have been devoted to research and investigation. Agricultural chemistry, botany and kindred studies can best be brought to the farmers by men who are students of these important topics so closely associated with agriculture.

Resolutions expressing the convention's high appreciation of the hospitality extended to the meeting by the State College, in the way of entertainment and by granting opportunity to the farmers of the State to visit and investigate the work accomplished by this, the Farmers' School of Pennsylvania, were passed, after which the meeting adjourned.

A. L. MARTIN,
Secretary.

FARMERS' INSTITUTES.

LIST OF COUNTY CHAIRMEN.

SEASON OF 1901-1902.

County.	Name.	Place.
Adams,	A. I. Weldner	Arendtsville.
Allegheny,	J. S. Burns,	Clinton.
Armstrong,	S. S. Blyholder,	Leechburg.
Beaver,	A. L. McKibben,	New Sheffield.
Bedford,	W. Clay Lutz,	Bedford.
Berks,	H. G. McGowan,	Geiger's Mills.
Blair,	H. L. Harvey,	Kipple.
Bradford,	L. Piolet,	Wysox.
Bucks,	Watson T. Davis,	Ivyland.
Butler,	W. H. H. Riddle,	Butler.
Cambria,	H. J. Krumenacker,	Nicktown.
Cameron,	W. H. Howard,	Emporium.
Carbon,	J. A. Werner,	Weatherly.
Centre,	John A. Woodward,	Howard.
Chester,	Dr. M. E. Conard,	Westgrove.
Clarion,	S. X. McClellan,	Knox.
Clearfield,	J. W. Nelson,	Shawmut.
Clinton,	Joel A. Herr,	Cedar Springs.
Columbia,	H. V. White,	Bloomsburg.
Crawford,	M. W. Oliver,	Conneautville.
Cumberland,	Rev. T. J. Ferguson,	Hogestown.
Cumberland,	R. H. Thomas,	Mechanicsburg.
Dauphin,	S. F. Barber,	Harrisburg.
Delaware,	J. Milton Lutz,	Llanerch.
Elk,	Joseph Kaiser,	St. Marys.
Erie,	Archie Billings,	Edinboro.
Fayette,	J. M. Hantz,	Merrittstown.
Forest,	Chas. A. Randall,	Tionesta.
Franklin,	C. B. Hege,	Marion.
Fulton,	R. M. Kendall,	McConnellsburg.
Greene,	J. Ewing Bailey,	Carmichaels.
Huntingdon,	G. G. Hutchison,	Warriors' Mark.
Indiana,	S. M. McHenry,	Indiana.
Jefferson,	Chas. G. McClain,	Rieggsd.
Junata,	Matthew Rodgers,	Mexico.
Lackawanna,	H. W. Northup,	Glenburn.
Lancaster,	W. H. Brosius,	Fernglen.
Lawrence,	Samuel McCreary,	Neshannock Falls.

County.	Name.	Place.
Lebanon,	H. C. Snively,	Lebanon.
Lehigh,	J. L. Schreiber,	Hosensack.
Luzerne,	J. E. Hildebrant,	Lehman.
Lycoming,	A. J. Kahler,	Hughesville.
McKean,	Charles N. Barrett,	Port Allegany.
Mercer,	S. A. Williams,	Volant, 4 R. D.
Mifflin,	D. E. Notestine,	Lewistown.
Monroe,	Randall Bisbing,	E. Stroudsburg.
Montgomery,	Jason Sexton,	North Wales.
Montour,	J. K. Murray,	Pottsgrove.
Northampton,	Wm. F. Beck,	Nazareth.
Northumberland,	J. A. Eshbach,	Milton.
Perry,	A. T. Holman,	Nekoda.
Philadelphia,	Edwin Lonsdale,	Wyndmoor.
Pike,	J. K. Van Etten,	Milford.
Potter,	Horace H. Hall,	Ellisburg.
Schuylkill,	W. H. Stout,	Pinegrove.
Snyder,	F. J. Schoch,	Selinsgrove.
Somerset,	N. B. Critchfield,	Critchfield.
Sullivan,	John W. Rodgers,	Forksville.
Susquehanna,	C. W. Brodhead,	Montrose.
Tioga,	F. E. Field,	Stonyfork.
Union,	J. N. Glover,	Vicksburg.
Venango,	W. A. Crawford,	Cooperstown.
Warren,	R. J. Weld,	Sugargrove.
Washington,	D. M. Pry,	Burgettstown.
Wayne,	Warren E. Perham,	Niagara.
Westmoreland,	M. N. Clark,	Claridge.
Wyoming,	D. A. Knuppenburg, ...	Lake Carey.
York,	B. P. Kohler,	Shrewsbury.

LIST OF STATE SPEAKERS ENGAGED IN FARMERS' INSTITUTE WORK IN PENNSYLVANIA.

DURING SEASON OF 1901-1902.

Alva Agee, Cheshire, O.	J. B. Johnston, New Wilmington.
Jas. Q. Atkinson, Three Tuns.	A. J. Kahler, Hughesville.
S. F. Barber, Harrisburg.	John H. Landis, Millersville.
R. L. Beardslee, Warrenham.	A. B. Lehman, Fayetteville.
M. S. Bond, Danville.	L. W. Lighty, East Berlin.
C. W. Brodhead, Montrose.	John T. McDonald, Delhi, N. Y.
Chas. A. Browne, Jr., State College.	D. B. McWilliams, Port Royal.
J. S. Burns, Clinton.	M. S. McDowell, State College.
Prof. Geo. C. Butz, State College.	W. F. McSparran, Furniss.
Dr. M. E. Conard, Westgrove.	Prof. Franklin Menges, York.
Prof. Wells W. Cooke, Washington,	C. D. Northrop, Elkland.
D. C.	Henry W. Northup, Glenburn.
Calvin Cooper, Bird-in-Hand.	J. Y. Patton, New Castle.
M. N. Clark, Claridge.	J. H. Peachy, Belleville.
Geo. Campbell, Greene's Landing.	C. L. Peck, Coudersport.
L. A. Clinton, Ithaca, N. Y.	D. H. Pershing, Stauffer.
John W. Cox, New Wilmington.	Thos. J. Phillips, Atglen.
Rev. J. D. Detrich, Flourtown.	W. H. H. Riddle, Butler.
S. R. Downing, Goshenville.	O. D. Schock, Hamburg.
S. R. Elder, Darlington.	R. S. Seeds, Birmingham.
G. C. Felix, Sallx.	W. H. Stout, Pinegrove.
F. E. Field, Stonyfork.	Jason Sexton, North Wales.
D. C. Gillespie, New Castle.	R. F. Schwarz, Analomink.
Dr. Wm. Frear, State College.	Prof. H. A. Surface, State College.
Prof. J. M. Hantz, Merrittstown.	Dr. I. A. Thayer, New Castle.
Prof. Harry Hayward, State College.	F. J. Wagner, Harrison City.
Joel A. Herr, Cedar Springs.	R. L. Watts, Scap Level.
E. S. Hoover, Lancaster.	R. J. Weld, Sugargrove.
George E. Hull, Orangeville, O.	H. V. White, Bloomsburg.
G. G. Hutchison, Warrior's Mark.	C. W. Williams, Hillsville.
W. A. Hutchison, Jeannette.	Col. Jno. A. Woodward, Howard.
Jasper T. Jennings, New Milford.	

SUPPLEMENTAL LIST OF LECTURERS.

INSTITUTE SEASON OF 1901-1902.

Martin G. Benedict, State College.	J. D. Nevins 403 Providence Building, Philadelphia.
Wm. M. Bigler, M. D., Tilden.	M. W. Oliver, Conneautville.
S. S. Brockway, Greenville.	Isaac Parry, Breadysville.
J. B. Buchanan, Kendall.	Mrs. Mary S. Parry, Higbee.
C. E. Chapman, Peruville, N. Y.	Jos. H. Paschall, Ward.
Prof. C. B. Cochran, West Chester.	Geo. T. Powell, Ghent, N. Y.
Miss Sarah A. Diem, Carmichaels.	Jos. Beatty Powell, Shadeland.
Dr. J. P. Edge, Downingtown.	Anna E. Redifer, State College.
Wm. M. Ely, Solebury.	Mattie Reeder, New Hope.
L. J. Farmer, Pulaski, N. Y.	Dr. M. P. Ravenel, Philadelphia.
Dr. C. E. Goldsborough, Hunterstown.	Mrs. Sarah Tyson Rorer, Philadelphia.
John Gould, Aurora Station, O.	Dr. N. C. Schaeffer, Harrisburg.
Dr. Geo. G. Groff, Lewisburg.	Noah Seanor, Plumville.
George W. Hood, Indiana.	R. S. Searle, Montrose.
W. Horace Hoskins, Philadelphia.	A. G. Seyfert, East Earl.
C. L. Hoyt, Horsehead, N. Y.	O. P. Shaver, Freidens.
W. B. K. Johnson, Allentown.	Jno. L. Shawver, Bellefontaine, O.
Helen Stowell Johnson, Corry.	Robt. M. Simmers, Phoenixville.
Florence R. Kenderdine, Lumberville.	Frank Simpson, Ridgway.
W. H. Knouse, Swales.	W. C. Sloan, Sloan.
Rev. M. D. Lichliter, Pittsburg.	Wellington Smith, Mifflintown.
Col. W. Penn Lloyd, Mechanicsburg.	T. B. Terry, Hudson, O.
Dr. J. M. Martin, Mercersburg.	Jacob Twining, Newtown.
T. O. Milliken, Cornpropsts Mills.	Emil Ulrich, Stroudsburg.
Col. Geo. Nox McClain, Philadelphia.	Prof. Geo. C. Watson, State College.
R. E. McDaniel, Springdale.	Jas. A. Waugh, Pittsburg.
M. E. McDonnell, State College.	J. S. Woodward, Lockport, N. Y.
Miss M. Alice Meyer, Clintondale.	A. P. Young, Millville.
Geo. A. Mitchell, Vineland, N. J.	
Frank N. Moore, North Orwell.	

DEPARTMENT LECTURERS.

PROF. JOHN HAMILTON, Secretary of Agriculture.
 HON. A. L. MARTIN, Director of Institutes.
 JESSE K. COPE, Dairy and Food Commissioner.
 BENJ. F. MacCARTNEY, Economic Zoologist.
 DR. LEONARD PEARSON, State Veterinarian.

DIRECTIONS FOR CONSTITUTING LOCAL COMMITTEES ON INSTITUTE WORK IN THE SEVERAL COUNTIES OF PENNSYLVANIA.

The act of March 13, 1895 (Section 5), makes the following provisions: "That it shall be the duty of the Superintendent of Institutes to arrange them in such manner as to time and places of holding the same, as to secure the greatest economy and efficiency of service, and to this end he shall, in each county where such institutes are to be held, confer and advise with the local member of the State Board of Agriculture, together with the representatives duly appointed by each county agricultural, horticultural or other like organization, with reference to the appointment of speakers and other local arrangements."

In order to carry this provision of the law into effect, the Director of Institutes directs that these representatives, one from each county organization as stated, duly chosen and properly credited, together with the local member of the State Board of Agriculture, shall constitute a board of County Institute Managers, of which the local member of the State Board of Agriculture shall be the chairman. The organizations entitled to representation, are, county agricultural societies, county horticultural societies, pomona granges and county alliances.

The duty of this board shall be to confer and advise with each other and the Director of Institutes, with reference to the appointment of speakers and other local arrangements for holding institutes.

It shall be the duty of each county organization named, to notify the Director of Institutes of the appointment of its representative and at the same time give a similar notice to the local member of the State Board of Agriculture, if there is one in that county.

The local member of the State Board of Agriculture, together with these representatives of the county organizations, shall meet for organization on the second Tuesday of June in each year, at one o'clock P. M., in the county town, at the office of the county commissioners. At this meeting the places for holding institutes for the ensuing season shall be selected, the same to be subject to the approval of the Director of Institutes. An institute committee will also be appointed, at this time, for each locality in which institutes are to be held.

The local member of the State Board, and each duly accredited

representative of the county organization in attendance upon this meeting shall, upon the certificate of the chairman of the board of managers, be paid his expenses, not to exceed two dollars.

In these meetings every member shall have equal voice, and the action of the majority shall decide. Notice of the action of the board shall be sent by the chairman to the Director of Institutes, within ten days after the meeting.

In counties where the State Board of Agriculture has no member, or when he may for any reason decline to serve as member and chairman of the committee, the representative of the county organizations mentioned, shall elect a chairman and notify the Director of Institutes of the fact. Or, if after the meeting for organization the chairman does not call a second meeting of the committee at least sixty days prior to the date fixed for holding the first institute, then the other members shall meet and proceed to arrange for the institute, first notifying the Director of Institutes of their action.

In case no representative from any county organizations of that county shall appear in the meeting on the second Tuesday of June as stated, then the local member of the State Board of Agriculture shall immediately report the fact to the Director of Institutes and proceed to arrange for the holding of institutes that year, without further consultation with the local organizations.

All moneys allotted to any county for use in institute work will be paid to the chairman of the local committee, to be accounted for by him in an itemized statement, audited and signed by auditors appointed by the committee, and then forwarded to this Department, not later than the first day of May in each year.

SUGGESTIONS TO INSTITUTE MANAGERS.

Prepare programme at least thirty days before date of Institute.

Arrangement should be made with persons in your locality who are to take part, at least eight weeks previous to meeting.

Have a Question Box, and place it in charge of some competent person whose work will be to carefully conduct the same.

Exclude from Institutes all sectarian and partisan topics.

Print on programme the name of Chairman and members of Committees.

Thoroughly advertise the Institute by distributing programmes, invitation by postal cards and posters, and secure the aid and good will of your local newspaper.

Select a competent Secretary to take notes and report proceedings of meeting to local papers.

Invite representatives of newspapers to a place at Recording Secretary's table, and solicit their aid and assistance in reporting proceedings of meetings.

For a two-days' Institute, provide for five sessions, each session devoted to a certain topic, and have no local speaker crowded off programme for want of time, unless unavoidable.

Locate Institutes where a suitable hall or church can be procured and the greatest number can be accommodated, as these meetings are for the benefit of the farmers and their families.

Extend a personal invitation to your County Superintendent of Public Schools to be present and take part, especially at the educational session, without which no Institute is complete. Invite all farm organizations, all school teachers and children, especially the ladies, to attend and to take part in the exercises.

At least three State speakers will be in attendance, and a list of topics which they are prepared to discuss can be found in the Institute Bulletin. From this list the Committee on Programme can select such topics as would most interest the farmers in their section, and place same opposite the lecturer's name on programme.

The County Chairman should, as soon as arrangements are completed for holding Institute, enclose to all lecturers expected to be present, a copy of programme, with letter designating what railroad station to stop at, and the name of the hotel secured for their accommodation. In case Institute is held at a distance from railroad, speakers should be met by conveyance and taken to Institute. The expense of getting from and to such stations is to be paid by County Chairman.

Remember the Institute is for the whole county and not merely for the town or locality where held. Begin advertising early and do not fail to let the public know of your meeting.

The State is divided into five sections. Beginning December 3d, five institutes will be in session at the same time. At least three State speakers will be present at all Institutes. One State speaker will be a special representative of the Department and have charge of the section, and may be regarded as an assistant to the presiding officer in the performance of his duties.

It is important that the Chairman of County Board of Institute Managers make a complete report of his Institutes, and mail same to the Director of Institutes as soon as possible after the close of the Institutes. Blanks for this purpose will be forwarded him. All essays of merit, read before Institutes, should be collected by the County Chairman, and forwarded to the Director of Institutes. A number of these essays are published in the annual report, and we

regret that space forbids that all can not be published. In selecting essays for publication, we find numerous essays treating upon the same topic, all meritorious, yet space would forbid the publication of more than one essay upon a given topic. These papers are placed upon file and kept for future reference.

GENERAL ROUND-UP OF FARMERS' INSTITUTE MANAGERS AND LECTURERS.

HELD AT STATE COLLEGE, JUNE 5-6-7, 1901.

PROGRAMME.

INSTITUTE MANAGERS' SESSION.

Wednesday Evening, June 5, 1901.

Call to order at 7.30 P. M.

Adjournment on Motion.

HOWARD G. McGOWAN, Berks County, Chairman.

1. OPENING ADDRESS,

Hon. A. L. Martin, Deputy Secretary and Director of Farmers' Institutes.

2. "SHOULD AN INSTITUTE BE HELD IN THE COUNTRY WHERE THE HALL IS OF INSUFFICIENT SIZE TO ACCOMMODATE THE PEOPLE, OR IN THE ADJOINING TOWNS?"

Dr. M. E. Conard, West Grove, Chester county, Pa.; Joel A. Herr, Cedar Springs, Clinton county, Pa.

GENERAL DISCUSSION.

3. "WHAT IS THE MOST EFFECTIVE WAY OF ADVERTISING OUR INSTITUTES?"

Samuel McCreary, Neshannock Falls, Lawrence county, Pa.; H. V. White, Bloomsburg, Columbia county, Pa.

GENERAL DISCUSSION.

4. "HOW SHOULD THE TIME BE APPORTIONED BETWEEN THE LOCAL AND STATE SPEAKERS?"

F. E. Field, Stonyfork, Tioga county, Pa.; Jason Sexton, North Wales, Montgomery county, Pa.

GENERAL DISCUSSION.

5. "WHAT ARRANGEMENTS SHOULD BE MADE FOR THE ENTERTAINMENT OF LOCAL LECTURERS?"

Wm. F. Beck, Nazareth, Northampton county, Pa.; D. A. Knuppenburg, Lake Carey, Wyoming county, Pa.

GENERAL DISCUSSION.

THURSDAY MORNING.

Note.—No session will be held Thursday morning, June 6, in order to afford those in attendance opportunity to visit the State College and Experiment Station.

Thursday Afternoon, June 6, 1901.

Call to order at 1.30 P. M.

Adjournment on Motion.

HON. W. H. BROSIUS, Lancaster County, Chairman.

1. "THE IDEAL FARMERS' INSTITUTE."

Col. Jno. A. Woodward, Howard, Centre county,
Pa.; R. J. Weld, Sugargrove, Warren county,
Pa.

GENERAL DISCUSSION.

2. "THE MOST EFFECTIVE MODE OF PRESENTING AGRICULTURAL
INFORMATION TO THE AVERAGE AUDIENCE."Alva Agee, Cheshire, O.; S. F. Barber, Harris-
burg, Pa.; R. S. Seeds, Birmingham, Hunt-
ington county, Pa.

GENERAL DISCUSSION.

3. "WHICH ACCOMPLISHES THE BEST RESULTS, THE TWO SESSION OR
THE FIVE SESSION INSTITUTE?"Prof. S. B. Heiges, York, York county, Pa.;
Enos H. Hess, State College, Pa.; Rev. J. D.
Detrich, Flourtown, Montgomery county, Pa.

GENERAL DISCUSSION.

Thursday Evening, June 6, 1901.

Call to order at 7.30 P. M.

Adjournment on Motion.

J. S. BURNS, Allegheny County, Chairman.

1. "HOW CAN THE QUESTION BOX BE MANAGED TO THE BEST AD-
VANTAGE?"C. D. Northrop, Elkland, Toga county, Pa.;
Frank Simpson, Ridgway, Elk county, Pa.

GENERAL DISCUSSION.

2. "HOW SHOULD THE COUNTRY HOME SESSION BE CONDUCTED, AND
WHAT SHOULD BE ITS LEADING FEATURES?"Hon. N. B. Critchfield, Critchfield, Somerset
county, Pa.; Prof. J. M. Hantz, Merrittstown,
Fayette county, Pa.; J. Milton Lutz, Llan-
erch, Delaware county, Pa.

GENERAL DISCUSSION.

3. "WHAT SHOULD BE THE LEADING FEATURES OF THE EDUCA-
TIONAL SESSION?"Thos. J. Philips, Atglen, Chester county, Pa.;
W. F. McSparran, Furniss, Lancaster county,
Pa.

GENERAL DISCUSSION.

CLOSING SESSION.

Friday Morning, June 7, 1901.

Call to order at 9 A. M.

Adjournment on Motion.

GEORGE G. HUTCHISON, Huntingdon County, Chairman.

1. ADDRESS.

Dr. H. P. Armsby, State College, Pa.

2. "SUGGESTIONS OF LEADING TOPICS FOR THE NEXT SEASON'S INSTITUTES."

W. H. H. Riddle, Butler, Butler county, Pa.;
Dr. Leonard Pearson State Veterinarian; L.
W. Lighty, East Berlin, Adams county, Pa.

GENERAL DISCUSSION.

3. "RELATION OF STATE COLLEGE TO FARMERS' INSTITUTES."

Hon. T. O. Milliken, Cornpropsts Mills, Huntingdon county, Pa.; W. A. Hutchison, Manor Station, Westmoreland county, Pa.; R. L. Watts, Scalp Level, Cambria county, Pa.

GENERAL DISCUSSION.

COMMONWEALTH OF PENNSYLVANIA.

STATE LIVE STOCK SANITARY BOARD.

1902.

PRESIDENT.

Hon. William A. Stone, Governor.

VICE PRESIDENT.

Jesse K. Cope, Dairy and Food Commissioner.

TREASURER.

Prof. John Hamilton, Secretary of Agriculture.

SECRETARY.

Dr. Leonard Pearson, State Veterinarian.

AN ACT ESTABLISHING THE STATE LIVE STOCK SANITARY BOARD.

AN ACT

To establish the State Live Stock Sanitary Board of Pennsylvania, and to provide for the control and suppression of dangerous, contagious or infectious diseases of domestic animals.

Section 1. Be it enacted, etc., That a Board is hereby established to be known as "The State Live Stock Sanitary Board." This Board shall consist of the Governor of the Commonwealth, the Secretary of Agriculture, the State Dairy and Food Commissioner and the State Veterinarian, who shall be a competent and qualified person as provided in the act, entitled "An act to create a Department of Agriculture and define its duties."

Section 2. That it shall be the duty of the State Live Stock Sanitary Board to protect the health of the domestic animals of the State,

to determine and employ the most efficient and practical means for the prevention, suppression, control or eradication of dangerous, contagious or infectious diseases among the domestic animals, and for these purposes it is hereby authorized and empowered to establish, maintain, enforce and regulate such quarantine and other measures relating to the movements and care of animals and their products, the disinfection of suspected localities and articles and the destruction of animals, as it may deem necessary, and to adopt from time to time all such regulations as may be necessary and proper for carrying out the purposes of this act: Provided, however, In the case of any slowly contagious diseases only suspected or diseased animals shall be quarantined.

Section 3. That when it shall be deemed necessary to condemn and kill any animal or animals to prevent the further spread of disease, and an agreement cannot be made with the owners for the value thereof, three appraisers shall be appointed, one by the owner, one by the commission or its authorized agent, and the third by the two so appointed, who shall, under oath or affirmation, appraise the animal or animals, taking into consideration their actual value and condition at the time of appraisalment, and such appraised price shall be paid in the same manner as other expenses under this act are provided for: Provided, That under such appraisalment not more than twenty-five dollars shall be paid for any infected animal of grade or common stock, and not more than fifty dollars for any infected animal of registered stock, nor more than forty dollars for any horse or mule of common or grade stock and not to exceed fifty per cent. of the appraised value of any standard bred, registered or imported horses.

Section 4. That the Board or any member thereof, or any of their duly authorized agents, shall at all times have the right to enter any premises, farms, fields, pens, abattoirs, slaughter houses, buildings, cars or vesels, where any domestic animal is at the time quartered, or wherever the carcass of one may be, for the purpose of examining it in any way that may be deemed necessary to determine whether they are or were the subjects of any contagious or infectious diseases.

Section 5. That any person or persons wilfully violating any of the provisions of this act or any regulation of the State Live Stock Sanitary Board, or wilfully interfering with officers appointed under this act, shall be deemed guilty of misdemeanor and shall, upon conviction, be punished by a fine not exceeding one hundred dollars or by imprisonment not exceeding one month, or both, at the discretion of the court.

Section 6. That the State Live Stock Sanitary Board is hereby empowered to appoint and employ such assistants and agents and to

purchase such supplies and materials as may be necessary in carrying out the provisions of this act, and the Board and the members thereof are hereby empowered to administer oaths or affirmations to the appraisers appointed under this act, that they may order and conduct such examinations into the condition of the live stock of the State in relation to contagious diseases, including the milk supplies of cities, towns, boroughs and villages, as may seem necessary, and to take proper measures to protect such milk supplies from contamination.

Section 7. That all necessary expenses under the provisions of this act shall, after approval in writing by the Governor and the Secretary of Agriculture, be paid by the State Treasurer upon the warrant of the Auditor General in the manner now provided by law.

Section 8. That this act shall take effect June first, one thousand eight hundred and ninety-five, and all acts or parts of acts inconsistent herewith are hereby repealed.

Approved—May 21st, 1895.

AN ACT TO PROTECT THE HEALTH OF DOMESTIC ANIMALS.

AN ACT

To protect the health of the domestic animals of the Commonwealth of Pennsylvania.

Section 1. Be it enacted, &c., That the importation of dairy cows and neat cattle for breeding purposes into the Commonwealth of Pennsylvania is hereby prohibited, excepting when such cows and neat cattle are accompanied by a certificate from an inspector, whose competency and reliability are certified to by the authorities charged with the control of the diseases of domestic animals in the State from whence the cattle came, certifying that they have been examined and subjected to the tuberculin test and are free from disease.

Section 2. That in lieu of an inspection certificate as above required, the cattle may be detained at suitable stock-yards nearest to the State line on the railroad over which they are shipped, and there examined at the expense of the owner, or cattle as above specified from points outside of the State may, under such restrictions as may be provided by the State Live Stock Sanitary Board, be shipped in quarantine to their destination in Pennsylvania, there to remain in quarantine until properly examined at the expense of the owner, and released by the State Live Stock Sanitary Board.

Section 3. The State Live Stock Sanitary Board is hereby authorized and empowered to prohibit the importation of domestic animals into the Commonwealth of Pennsylvania, whenever in their judgment such measures may be necessary for the proper protection of the health of the domestic animals of the Commonwealth, and to make and enforce rules and regulations governing such traffic as may from time to time be required.

Section 4. That any person, firm, or corporate body violating the provisions of this act, shall be deemed guilty of a misdemeanor, and upon conviction shall, in the proper court of the county in which such cattle are sold, offered for sale, delivered to a purchaser, or in which such cattle may be detained in transit, for each offense, forfeit and pay a fine of not less than fifty dollars or more than one hundred dollars, or be punished by imprisonment for not less than ten days, and not exceeding thirty days, either or both, at the discretion of court. Such person, firm or corporate body shall be liable for the full amount of the damages that may result from the violation of this act.

Section 5. The State Live Stock Sanitary Board is hereby charged with the enforcement of this act, and is authorized to see that its provisions are obeyed, and to make, from time to time, such rules and regulations as may be necessary and proper for its enforcement.

Section 6. That this act shall go into effect January first, one thousand eight hundred and ninety-eight.

Approved May 26, 1897.

RULES FOR THE ENFORCEMENT OF THE ACT OF MAY 26, 1897.

Dairy cows and neat cattle for breeding purposes may be brought into Pennsylvania from other States only in accordance with one of the three following provisions:

1. The cattle may be examined and tested with tuberculin in the State from whence they come by an inspector whose competency and reliability are certified to by the authorities charged with the control of the diseases of animals in that State. Special blanks for reporting upon such examinations will be furnished by the State Live Stock Sanitary Board upon application. Cattle thus examined, found to be free from disease and brought into Pennsylvania, shall remain in the possession of the person or persons who own them when

brought into Pennsylvania until the inspection reports have been approved by a member of the State Live Stock Sanitary Board or by an agent authorized to approve such reports. After such approval the cattle can be disposed of without restriction.

2. Dairy cows and neat cattle for breeding purposes may, if shippers so elect, be examined and tested with tuberculin at suitable stock-yards nearest to the State line on the railroad over which they are shipped. Such examinations are to be made by inspectors approved by this Board and at the expense of the owner of the cattle.

Cattle so inspected shall be marked with a suitable metal tag or shall be accurately described so that they can be reliably identified, and a report on the examination and test, with directions for identification, shall be submitted without delay to this Board.

3. Dairy cows and neat cattle for breeding purposes may be brought into Pennsylvania without previous examination only under the following conditions:

A. Notification to the State Live Stock Sanitary Board that it is proposed to bring certain dairy cows or neat cattle for breeding purposes into this State. Such notice must be accompanied by the number and a full and accurate description of the cattle, the names and addresses of the owner and consignee, the date upon which they are to be brought into the State, the route over which they are to be driven or shipped, and the destination.

A blank form to use in rendering this report will be sent upon application to the State Live Stock Sanitary Board.

B. Such cattle shall remain in strict quarantine during transit and after they have arrived at their destination until they have been examined and tested with tuberculin by an inspector approved by this Board. Under this quarantine it is required that the cattle shall be kept apart from other cattle, that they shall remain in the possession of the person or persons who bring them into this State and that their milk shall not be sold or used without previous sterilization by boiling.

Dairy cows or neat cattle for breeding purposes brought into Pennsylvania under this provision that are found upon examination or test to be tuberculous, shall be strictly isolated and quarantined, their milk cannot be used for any purpose whatever without previous sterilization by boiling, and they shall not be moved to other premises excepting for slaughter. No compensation shall be allowed for such cattle.

Approved by the State Live Stock Sanitary Board at Harrisburg, Pa., November 5, 1897.

LEONARD PEARSON,
Secretary,

A SUPPLEMENT TO AN ACT FOR THE TAXATION OF DOGS AND THE PROTECTION OF SHEEP.

A SUPPLEMENT

To an act, entitled "An act for the taxation of dogs and the protection of sheep," approved the twenty-fifth day of May, Anno Domini one thousand eight hundred and ninety-three, providing that the fund raised by the taxation of dogs be applied, in addition to the loss of sheep, for the loss of other domestic animals bitten by mad dogs.

Section 1. Be it enacted, &c., That the fund raised by the taxation of dogs, as provided by the act of the General Assembly, entitled "An act for the taxation of dogs and the protection of sheep," approved the twenty-fifth day of May, Anno Domini one thousand eight hundred and ninety-three, in addition to the application thereof for the payment of losses sustained by the destruction and damage to sheep, be applied for the payment of horses, mules, cattle and swine bitten by mad dog or mad dogs, and destroyed or necessary to be destroyed by reason thereof. Said damages shall be ascertained and recovered in the same manner as provided by sections three, four and five of the said act: Provided, That in no case shall the value of each horse or mule exceed one hundred dollars, the value of each head of cattle forty dollars, and each head of swine six dollars.

Section 2. All acts or supplements of acts inconsistent with the provisions of this supplement are hereby repealed: Provided, That this supplement shall not repeal or affect the provision of any special law relating to the same subject in any county, township, borough or city in this Commonwealth.

Approved—The 11th day of April, A. D. 1901.

AN ACT FOR THE PREVENTION OF THE SPREAD OF DISEASE FROM THE CARCASSES OF ANIMALS.

AN ACT

To provide for the prevention of the spread of disease from the carcasses of animals that die of dangerous or virulent disease, or are killed while afflicted with such disease; to provide for the safe disposal or destruction of such carcasses; to authorize the State Live Stock Sanitary Board to make regulations for the enforcement of this act; and to provide penalties for the violations of this act and of the regulations that may be made under it by the State Live Stock Sanitary Board.

Section 1. Be it enacted, &c., That when any domestic animal may die of, or be killed while afflicted with an infectious, contagious, germ or parasitic disease, adjudged by the State Live Stock Sanitary Board to be of a dangerous or virulent character, and in particular when any domestic animal may die or be killed while it is afflicted with any one of the diseases known as anthrax, black quarter, hog cholera, swine plague, rabies or glanders, the owner or owners of such animal shall at once destroy or dispose of the carcass of such animal by one of the methods herein provided.

Section 2. The methods of destruction or disposal shall be of a kind that will completely destroy or securely sequester the poison, germ, parasite or infective agent of the disease with which the animal was afflicted at the time of death. The following methods of destruction or disposal shall be allowed: One. Complete burning or cremation of the carcass, and of all of its parts and products. Two. Boiling the carcass and all of its parts and products in water, or heating the same with steam, at the temperature of boiling water, for at least two hours. Three. Burying the carcass and all of its parts and products in a place that is not subject to overflow from ponds or streams, that is distant not less than one hundred feet from any water-course, well, spring, public highway or building used as a house or stable, and in the following manner to wit: The grave shall be of such depth that when the carcass and the parts and products thereof are placed in it, and the grave is filled with earth and the top is smoothed to the level of the surrounding surface, the uppermost part of the carcass and of its parts and products shall be completely covered; and, further, the grave shall be so protected that the carcass cannot be dug out or exposed by dogs or other ani-

mals. Before the carcass and its parts and products are covered with earth they shall be covered with lime, to a depth of not less than three inches. Any other method of destroying or disposing of carcasses, and of the parts and products of carcass, may be practiced that is specifically approved by the State Live Stock Sanitary Board.

Section 3. If any person owning an animal that dies while it is afflicted with anthrax, black quarter, hog cholera, swin plague, rabies or glanders, or any other infectious, contagious, germ or parasitic disease, that is adjudged by the State Live Stock Sanitary Board to be of a dangerous or virulent character, shall, after notification by anyone, neglect within twenty-four hours to destroy or dispose of the carcass and its parts and products in accordance with the provisions of section two of this act, the said person shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than ten dollars nor more than one hundred dollars, at the discretion of the court.

Section 4. When the carcass and products of any animal that died while afflicted with any of the diseases specified in section one of this act, or of any infectious, contagious, germ or parasitic disease, adjudged by the State Live Stock Sanitary Board to be of a dangerous or virulent character, is not disposed of or destroyed in one of the ways set forth in section two of this act, and this fact shall be brought to the attention of an agent of the State Live Stock Sanitary Board, the board of health of the township, borough or city in which the death occurs or in which the carcass of the animal may be; or when this fact shall be brought to the attention of any member of such board of health; or in the event that there is no board of health having jurisdiction, when any township auditor, of a township in which such a carcass may be, is notified of the fact; it shall be the duty of the said agent of the State Live Stock Sanitary Board, or member of a board of health, or said board of health, or said township auditor, to at once cause the carcass and its parts and products to be disposed of or destroyed in accordance with the methods prescribed in section two of this act.

The disposal or destruction of the carcass shall be carried out in a way that is as economical as is compatible with efficiency and safety, and a fully itemized bill of the expense incurred shall be drawn up by the agent of the State Live Stock Sanitary Board, the board of health, or the board of township auditors, and forwarded as a voucher to the State Live Stock Sanitary Board. If the voucher is approved by said board, it shall be paid in the same manner as other expenses of said board are paid: Provided, however, That no charge shall be paid of more than ten dollars for the destruction of a single carcass of a horse, mule, cow, bull or ox; nor more than

three dollars for the destruction of a single carcass of a colt, calf, sheep, hog or dog.

Section 5. The cost of the destruction of the carcass or carcasses, as hereinbefore provided, shall constitute a lien on the property of the owner or owners of the animal at the time of their death; and it shall be the duty of the State Live Stock Sanitary Board to attempt to recover, and if possible to recover, by due process of law, from said owner or owners the amounts expended by it for disposing of or destroying the carcass of their animals, in the enforcement of this act.

Approved—The 2d day of May, A. D. 1901.

EXTRACTS FROM THE RULES AND REGULATIONS OF THE STATE LIVE STOCK SANITARY BOARD OF PENNSYLVANIA.

Upon application from owners of tuberculous cattle, the State Live Stock Sanitary Board will furnish tuberculin and inspections free, on condition that the cattle owner will agree to:

1. Assist in the examination.
 2. Separate the cattle found to be tuberculous from those that are healthy, and have them cared for separately until disposed of, as directed by the State Live Stock Sanitary Board.
 3. Disinfect the stables and correct faulty sanitary conditions, as directed by the State Live Stock Sanitary Board.
 4. Discontinue the use of milk and cream from infected cows, except when boiled or heated to 185 degrees F. and kept at this temperature for five minutes.
-

Upon application from owners of dairy herds, the State Live Stock Sanitary Board will conduct or direct inspections of cattle and cattle stables and yards, and will furnish certificates showing the health of the animals and the sanitary condition of their surroundings: Provided, That the applicant will agree to bear the necessary expense of such inspections.

Since it is manifestly impossible for the State Live Stock Sanitary Board to investigate all rumors or unsubstantiated reports of contagious disease among domestic animals, the State Veterinarian may,

if in his opinion there exists a reasonable doubt as to the dangerous, contagious or infectious character of a reported disease, request the owner or person in charge of the stock, at his own expense, to have an examination made by a competent veterinarian, and furnish a report from such veterinarian to the Secretary of the Board. In case this request is not complied with, the Board may decline to consider the case.

The following blank is furnished by the Board:

“To the State Live Stock Sanitary Board, Harrisburg, Pennsylvania:

“Gentlemen: I have had my entire herd inspected and tested with tuberculin and have reason to believe that some of my cattle are affected with tuberculosis.

“I have had this inspection and test made at my own expense and now wish to dispose of the diseased animals in accordance with the rules and regulations of the State Live Stock Sanitary Board and to avail myself of the assistance afforded by the Commonwealth in such cases. If such assistance is furnished, I agree to thereafter observe the precautions and measures and to employ the means recommended by your Board to prevent the reintroduction and redevelopment of tuberculosis in my herd.

“My herd includes the following animals: Cows, heifers over one year old,, bulls over one year old, steers,, calves under one year old,; total, The milk from this herd is used by for

The cattle are,

The inspection and test were made by of on 190 .

“I certify that, to the best of my knowledge and belief, none of the dairy cows or cattle for breeding purposes in my herd have been brought from another State into Pennsylvania since January 1, 1898, without having been subjected to inspection and tuberculin test, as required by law.

Yours respectfully,

.....
 (Address)
 County, Pa.”

The usual application form is the following:

“To the State Live Stock Sanitary Board, Harrisburg, Pennsylvania:

“Gentlemen: I have reason to believe that some of my cattle are afflicted with tuberculosis, and I wish to have my entire herd in-

spected, and tested with tuberculin, if such test is deemed necessary by your representative, and the diseased animals disposed of according to the rules and regulations of the State Live Stock Sanitary Board.

"I understand that this inspection and test are to be made at the expense of the Commonwealth and, in consideration thereof, I agree to thereafter observe the precautions and measures and to employ the means recommended by your Board to prevent the reintroduction and redevelopment of tuberculosis in my herd.

"I certify that, to the best of my knowledge and belief, none of the dairy cows or cattle for breeding purposes in my herd have been brought from another State into Pennsylvania since January 1, 1898, without having been subjected to inspection and tuberculin test, as required by law.

Yours respectfully,

.....

(Address)

..... County, Pa.

"My herd includes the following animals: Cows, heifers over one year old,, bulls over one year old,, steers,, calves under one year old,; total, The milk from this herd is used by for

"The cattle are

(State breed and whether registered.)

.....

"The following are my reasons for believing that some of my cattle are afflicted with tuberculosis:

.....

PENNSYLVANIA LIVE STOCK BREEDERS' ASSOCIATION.

1902.

OFFICERS AND COMMITTEES.

PRESIDENT.

W. C. Norton, Aldenville.

FIRST VICE PRESIDENT.

Henry Palmer, Avondale.

SECOND VICE PRESIDENT.

M. P. Shoemaker, Greensburg.

SECRETARY.

E. S. Bayard, 201 Shady Ave., E. E., Pitts-
burg.

TREASURER.

J. F. Lantz, Isabella.

EXECUTIVE COMMITTEE.

W. G. Powell, Shadeland, Representing horses.
Edward Walter, West Chester, Representing cattle.
Wm. Berry, Washington, Representing sheep.
Geo. W. Church, Waynesburg, Representing swine.
Geo. C. Watson, State College, Representing poultry.
H. A. Field, Wellsboro, Representing Angora goats.

LEGISLATIVE COMMITTEE.

Dr. Thomas Turnbull, Chairman, Allegheny.
R. L. Munce, Canonsburg.
W. F. Gable, Altoona.
Wm. R. Williams, Philadelphia.
H. W. Comfort, Fallsington.
E. S. Bayard, 201 Shady Ave., E. E., Pitts-
burg.
W. C. Norton, *ex-officio*, Aldenville.

COMMITTEE ON FAIRS.

W. C. Black, Chairman, Mercer.
J. L. Henderson, Washington.
W. F. Holtzer, Greensburg.

COMMITTEE ON TRANSPORTATION.

Julius LeMoyne, Chairman, Washington.
Dr. Leonard Pearson, Philadelphia.
Prof. Harry Hayward, State College.
T. E. Orr, Pittsburg.
D. L. Stevens, Elkdale.

PENNSYLVANIA HORTICULTURAL SOCIETY.

FOUNDED 1827.

OFFICERS FOR THE YEAR 1902.

PRESIDENT.

James W. Paul, Jr.

VICE PRESIDENTS.

James M. Rhodes,
Henry F. Michell,Edward Le Boutillier,
Dr. George Goebel.

TREASURER.

S. W. Keith.

SECRETARY.

David Rust, Horticultural Hall, Broad street, below Locust, Philadelphia.

PROFESSOR OF BOTANY.

Stewardson Brown.

PROFESSOR OF HORTICULTURAL CHEMISTRY.

Dr. Persifor Frazer.

PROFESSOR OF ENTOMOLOGY.

Dr. Henry Skinner.

PROFESSOR OF BIOLOGY.

Dr. Ida A. Keller.

EXECUTIVE COUNCIL.

Robert Craig,
John McCleary,
Dr. J. Cheston Morris,William K. Harris,
John W. Pepper,
John Westcott,
Samuel T. Bodine.

MEMBER OF THE STATE BOARD OF AGRICULTURE.

Edwin Lonsdale.

HOUSE COMMITTEE.

William F. Dreer,

C. Hartman Kuhn,
James M. Rhodes.

LIBRARIAN.

David Rust.

COMMITTEES FOR 1902.

SECTIONS COMMITTEE.

J. Cheston Morris, M. D., Chairman;

Burnet Landreth, Wm. F. Dreer,
Mrs. E. S. Starr, Robert Craig,
Edwin Lonsdale.

FINANCE COMMITTEE.

Robt. Craig, Chairman.

Henry F. Michell, C. Hartman Kuhn.

LIBRARY COMMITTEE.

Burnet Landreth, Chairman;

C. Hartman Kuhn, George C. Watson,
J. D. Rand, S. W. Keith.

COMMITTEE FOR ESTABLISHING PREMIUMS.

Edwin Lonsdale, Chairman;

W. Atlee Burpee, Wm. K. Harris,
John G. Gardner, John McCleary,
John Westcott.

COMMITTEE OF MUSIC AND PRINTING.

Burnet Landreth, Chairman;

David Rust, Mathias Homer,
S. W. Keith.

COMMITTEES FOR AWARDED PREMIUMS.

Plants.

J. W. Collesh, Chairman;

W. A. Manda, Chester Davis,
Joseph Hurley, James Verner.

Flowers.

A. B. Cartledge, Chairman;

A. B. Scott, C. Elsele,
S. S. Pennock, H. B. Surman.

Fruits.

John G. Gardner, Chairman;

John C. Lewis, Wm. Warner Harper.

Vegetables.

W. Atlee Burpee, Chairman;

Wm. F. Dreer, Wm. Fowler,
S. P. Landreth, J. Cheston Morris, M. D.

COMMITTEE TO ARRANGE FOR AND SUPERINTEND EXHIBITIONS.

Geo. E. Campbell, Chairman;

D. T. Connor,	C. Hartman Kuhn,
Sidney W. Keith,	John Westcott,
David Bearn,	Robert Craig,
Joseph Heacock,	John Gaynor,
Wm. K. Harris,	Joseph McGregor,
	John W. Pepper.

COMMITTEE TO EXAMINE AND MAKE AWARDS ON NEW OR CHOICE
PLANTS, FLOWERS, FRUITS AND VEGETABLES.

Edwin Lonsdale, Chairman;

Plants.

Robert Craig,	Wm. K. Harris,
J. D. Eisele,	John Westcott,
	Alphonse Pericat.

Flowers.

Alex. B. Scott,	Samuel S. Pennock,
A. B. Cartledge,	Henry B. Surman,
	A. M. Herr.

Fruits and Vegetables.

W. Atlee Burpee,	F. Pedersen,
John G. Gardner,	J. Otto Thilow,
	Jos. McGregor.

Exhibits must be ready for examination by this committee at 3 P. M. on the dates of the regular monthly stated meetings of the Society (the third Tuesday of each month) and remain on exhibition until the close of the regular meeting in the evening.

Exhibits will also be examined by this committee at the spring and annual exhibitions of the Society.

Exhibitors of new or choice plants, flowers, fruits and vegetables are required to furnish, in writing, to the committee, whenever possible, full particulars about their exhibit, as to its origin; if a seedling, its parentage; if a foundling, under what conditions it was found; if a sport, what it sported from; also, its principal characteristics and to inform the Secretary of the Society, one week previous, of their intention to exhibit.

RULES GOVERNING EXHIBITIONS.

1. Entries should be made with the Secretary at least one week before the opening, with full list of articles and statement of classes in which they are entered.

2. No exhibit can be staked until the exhibitor has furnished the Secretary with a full list of all the articles offered. This rule applies to articles "for exhibition only" as well as to exhibits entered for competition.

3. All exhibits must be correctly labeled on stiff cards of a uniform size. These cards will be furnished free by the Society on application to the Secretary.

4. All entries not made according to schedule will be disqualified.

5. When possible, exhibits should be delivered at the exhibition hall by 6 P. M. of the evening preceding the exhibition, and all exhibits must be in position by 12 noon on the day specified.

6. All plants shown in competition (except imported plants shown for the first time in the country and novelties) must have been in the possession of the exhibitor at least four months preceding the exhibition.

7. All entries must be staged by numbers only, the names of exhibitors to be attached after awards are made.

8. No competitor shall receive more than one premium in each class for which he competes.

9. The committee awarding premiums may award a certificate of merit or medal for meritorious exhibits in addition to the regular premiums of the Society.

10. No person shall be allowed to remain in the hall during the time the judges and their assistants are at work.

11. The amount of \$3.00 shall be deducted from all premiums awarded to persons not members of the Society.

12. No awards will be made to unworthy objects, even although they may be the only ones of their kind on exhibition.

13. Exhibits sent from a distance should be addressed to the Secretary, and express charges invariably prepaid.

14. No exhibit shall be removed until the close of the exhibition, except with the consent of the officers in charge.

15. No card larger than 11x14 inches shall be allowed on any exhibits, and all cards to be furnished by the Society.

16. Each person who becomes an exhibitor thereby agrees to conform strictly to the rules and regulations.

PATRONS OF HUSBANDRY.

OFFICERS OF PENNSYLVANIA STATE GRANGE FOR THE YEAR 1902.

MASTER.

W. F. Hill, Westford, Crawford county.

OVERSEER.

A. C. Barrett, New Milford, Susquehanna county.

LECTURER.

Albert M. Cornell, Altus, Bradford county.

STEWARD.

H. M. Gooderham, Patton, Cambria county.

ASSISTANT STEWARD.

Henry H. Pratt, Goshenville, Chester county.

CHAPLAIN.

Rev. W. H. Clipman, Finleyville, Washington county

TREASURER.

S. E. Nivin, Landenburg, Chester county.

SECRETARY.

J. T. Ailman, Thompsontown, Juniata county.

GATEKEEPER.

W. Chase, Fall Brook, Tioga county.

CERES.

Mrs. V. B. Holiday, Crooked Creek, Tioga county.

LADY STEWARD.

Mrs. Mary Bloom, Lock Haven, Clinton county.

FLORA.

Miss Florence Rhone, Centre Hall, Centre county.

POMONA.

Mrs. L. A. Thayer, Atlantic, Crawford county.

FINANCE COMMITTEE.

D. B. McWilliams, Port Royal, Juniata county.

S. S. Blyholder, Leechburg, Armstrong county.

John T. Patton, Warriors' Mark, Huntingdon county.

EXECUTIVE COMMITTEE.

Hon. Louis Piolet, Wysox, Bradford county.

G. W. Oster, Osterburg, Bedford county.

I. Frank Chandler, Toughkenamon, Chester county.

LEGISLATIVE COMMITTEE.

Hon. W. T. Creasy, Catawissa, Columbia county.

Hon. Hampton Rice, Lumberville, Bucks county.

Hon. Leonard Rhone, Centre Hall, Centre county.

CENTRE OF COMMUNICATION.

S. B. Day, Washington R. Division No. 7, Washington county.

THE GRANGE.

ORDER OF PATRONS OF HUSBANDRY.

ITS ORIGIN.

The Order of the Patrons of Husbandry originated in the mind of O. H. Kelley, a man of New England birth, who went to Minnesota in his early manhood, and became a farmer in that section of the country.

In 1864 he was appointed a clerk in the Department of Agriculture at Washington. Two years later, in January, 1866, Mr. Kelley was commissioned by Hon. Isaac Newton, Commissioner of Agriculture, to visit the Southern States, lately in hostility to the government, for the purpose of obtaining statistical and other information in regard to the condition of the South, and report the same to the Department at Washington.

It was while traveling in the South in obedience to these instructions, that the thought of a secret society of agriculturists, for the protection and advancement of their interests, and as an element to restore kindly feeling among the people, first occurred to Mr. Kelley.

The idea of giving women full membership in the proposed Order originated with Miss Carrie A. Hall, of Boston, Mass., a niece of Mr. Kelley, to whom he had imparted his views of the new association after his return from the South. In the full formation of the Order, six other men were directly associated with Mr. Kelley, namely, William Saunders, of the Department of Agriculture, who next to Mr. Kelley, did most in originating the Order, Rev. A. B. Grosh, of the same Department, William M. Ireland, of the Postoffice Department, Rev. John Trimble and J. R. Thompson, of the Treasury Department, and F. M. McDowell, a pomologist, of Wayne, N. Y., all of whom, with one exception, were born upon a farm.

These seven men were the founders of the Order, and for nearly two years they labored with great energy, and with a faith and zeal amounting almost to inspiration, until, with the assistance of friends who became interested in the plan, they completed a well-devised scheme of organization, based upon a ritual of four degrees for men and four for women, which is unsurpassed in the English language for originality of thought, purity of sentiment, and beauty of diction.

Having formed a constitution to govern the Order to which this ritual was adopted, these men met on the fourth day of December,

1867, and constituted themselves the National Grange of the Patrons of Husbandry, with William Saunders as master, J. R. Thompson, lecturer, William M. Ireland, treasurer and O. H. Kelley, secretary. The remaining offices, for obvious reasons, were left vacant.

The little brown building in which the organization was effected was at that time the office of Mr. Saunders, and stood embowered with the trees in the gardens of the Agricultural Department on the corner of Four-and-half street and Missouri avenue. Later, the late Colonel Aiken, of South Carolina, and other interested members of the Order made vigorous efforts to have the government preserve this historic building, but they were unsuccessful in their efforts.

The first Subordinate Grange was organized in Washington, D. C., the 8th day of January, 1868, as a school of instruction, with William M. Ireland as master.

The first dispensation for a Grange was granted at Harrisburg, Pa., the 4th day of April, 1868, but the first regular Subordinate Grange to which a charter was issued was organized at Fredonia, N. Y., the 16th day of April, 1868.

The first State Grange, that of Minnesota, was organized the 22d day of February, 1869. The new Order made slow progress up to 1872, only 257 Granges having been organized in the entire country. During the year 1872, 1,105 were organized and the Order had an existence in twenty-two States.

The first meeting of the National Grange, as a delegate body, was held at Georgetown, D. C., the 8th day of January, 1873, with six of the founders of the Order and seventeen delegates present, representing eleven States; six of the delegates were masters of State Granges, and the remainder were deputies in the Order. In addition to these, four women were present, viz: Miss Carrie A. Hall, Mrs. O. H. Kelley, Mrs. D. W. Adams and Mrs. J. C. Abbott. The total number of Granges organized previous to this meeting was 1,362. Nearly 30,000 charters have been issued to January 1, 1900.

DECLARATION OF PURPOSES OF THE PATRONS OF HUSBANDRY.

PREAMBLE.

Profoundly impressed with the truth that the National Grange of the United States should definitely proclaim to the world its general objects, we hereby unanimously make this Declaration of Purposes of the Patrons of Husbandry:

GENERAL OBJECTS.

1. United by the strong and faithful tie of Agriculture, we mutually resolve to labor for the good of our Order, our country, and mankind.

2. We heartily endorse the motto: "In essentials, unity; in non-essentials, liberty; in all things, charity."

3. We shall endeavor to advance our cause by laboring to accomplish the following objects:

To develop a better and higher manhood and womanhood among ourselves. To enhance the comforts and attractions of our homes, and strengthen our attachments to our pursuits. To foster mutual understanding and co-operation. To maintain inviolate our laws, and to emulate each other in labor, to hasten the good time coming. To reduce our expenses, both individual and corporate. To buy less and produce more, in order to make our farms self-sustaining. To diversify our crops, and crop no more than we can cultivate. To condense the weight of our exports, selling less in the bushel and more on the hoof and in fleece; less in lint, and more in warp and woof. To systematize our work, and calculate intelligently on probabilities. To discountenance the credit system, the mortgage system, the fashion system, and every other system tending to prodigality and bankruptcy.

We propose meeting together, talking together, working together, buying together, selling together, and, in general, acting together for our mutual protection and advancement, as occasion may require.

We shall avoid litigation as much as possible by arbitration in the Grange. We shall constantly strive to secure entire harmony, good will, vital Brotherhood among ourselves, and to make our Order perpetual. We shall earnestly endeavor to suppress personal, local, sectional, and national prejudices, all unhealthy rivalry, all selfish ambition. Faithful adherence to these principles will insure our mental, moral, social and material advancement.

BUSINESS RELATIONS.

4. For our business interests, we desire to bring producers and consumers, farmers and manufacturers, into the most direct and friendly relations possible. Hence we must dispense with a surplus of middle men, not that we are unfriendly to them, but we do not need them. Their surplus and their exactions diminish our profits.

We wage no aggressive warfare against any other interests whatever. On the contrary, all our acts and all our efforts, so far as business is concerned, are not only for the benefit of the producer and consumer, but also for all other interests that tend to bring these two parties into speedy and economical contact. Hence we hold that

transportation companies of every kind are necessary to our success, that their interests are intimately connected with our interests, and harmonious action is mutually advantageous, keeping in view the first sentence of our Declaration of Principles of action, that "Individual happiness depends upon general prosperity."

We shall, therefore, advocate for every State the increase in every practical way, of all facilities for transporting cheaply to the seaboard, or between home producers and consumers, all the productions of our country. We adopt it as our fixed purpose to "open out the channels in nature's great arteries, that the life blood of commerce may flow freely."

We are not enemies of railroads, navigable and irrigating canals, nor any corporation that will advance our industrial interests, nor of any laboring classes.

In our noble Order there is no communism, no agrarianism.

We are opposed to such spirit and management of any corporation or enterprise as tends to oppress the people and rob them of their just profits. We are not the enemies to capital, but we oppose tyranny of monopolies. We long to see the antagonism between capital and labor removed by common consent, and by an enlightened statemanship worthy of the nineteenth century. We are opposed to excessive salaries, high rates of interest and exorbitant per cent. profits in trade. They greatly increase our burdens, and do not bear a proper proportion to the profits of producers. We desire only self-protection, and the protection of every true interest of our land, by legitimate transactions, legitimate trade, legitimate profits.

EDUCATION.

We shall advance the cause of education among ourselves, and for our children, by all just means within our power. We especially advocate for our agricultural and industrial colleges, that practical agriculture, domestic science, and all the arts which adorn the home, be taught in their courses of study.

THE GRANGE NOT PARTISAN.

5. We emphatically and sincerely assert the oft repeated truth taught in our organic law, that the Grange—National, State, or Subordinate—is not a political or party organization. No grange, if true to its obligations, can discuss partisan or sectarian questions, nor call political conventions, nor nominate candidates, nor even discuss their merits in its meetings.

Yet the principles we teach underlie all true politics, all true statesmanship, and if properly carried out will tend to purify the whole political atmosphere of our country. For we seek the greatest good to the greatest number.

We must always bear in mind that no one, by becoming a Patron of Husbandry, gives up that inalienable right and duty which belongs to every American citizen, to take a proper interest in the politics of his country.

On the contrary, it is right for every member to do all in his power legitimately to influence for good the action of any political party to which he belongs. It is his duty to do all he can in his own party to put down bribery, corruption and trickery; to see that none but competent, faithful and honest men, who will unflinchingly stand by our interests, are nominated for all positions of trust; and to have carried out the principle which should always characterize every Patron, that the office should seek the man, and not the man the office.

We acknowledge the broad principle that difference of opinion is no crime, and hold that "progress toward truth is made by difference of opinion," while "the fault lies in bitterness of controversy."

We desire proper equality, equity and fairness; protection for the weak, restraint upon the strong, and in short, justly distributed burdens and justly distributed power. These are American ideas, the very essence of American independence, and to advocate to the contrary is unworthy of the sons and daughters of the American Republic.

We cherish the belief that sectionalism is, and of right should be, dead and buried with the past. Our work is for the present and future. In our agricultural brotherhood and its purposes, we shall recognize no North, no South, no East, no West.

It is reserved by every Patron, as the right of a freeman, to affiliate with any party that will best carry out his principles.

OUTSIDE CO-OPERATION.

6. Our being peculiarly a farmers' institution, we cannot admit all to our ranks.

Many are excluded by the nature of our organization, not because they are professional men, or artisans, or laborers, but because they have not a sufficient direct interest in tilling the soil, or may have some interest in conflict with our purposes. But we appeal to all good citizens for their cordial co-operation to assist in our efforts towards reform, that we may eventually remove from our midst the last vestige of tyranny and corruption.

We hail the general desire for fraternal harmony, equitable compromise, and earnest co-operation, as an omen of our future success.

CONCLUSION.

7. It shall be an abiding principle with us to relieve any of our oppressed and suffering brotherhood by any means at our command.

Last, but not least, we proclaim it among our purposes to inculcate a proper appreciation of the abilities and sphere of women, as is indicated by admitting her to membership and position in our Order.

Imploring the continued assistance of our Divine Master to guide us in our work, we here pledge ourselves to faithful and harmonious labor for all future time, to return by our united efforts to the wisdom, justice, fraternity and political purity of our forefathers.

STATE FARMERS' ALLIANCE AND INDUSTRIAL UNION.

OFFICERS FOR 1902.

PRESIDENT.

W. A. Gardner, Andrews' Settlement.

VICE PRESIDENT.

G. M. Branthaver, New Franklin.

SECRETARY AND BUSINESS AGENT.

D. M. Omwake, Greencastle.

TREASURER.

Andrew Story, Meadville, Rural Route
No. 3.

LECTURERS.

District No. 1, Northeast.—Effie M. Vangorder, Nicolson; composing the counties of Tioga, Susquehanna, Lycoming, Wyoming, Pike, Montour, Columbia, Monroe, Bradford, Wayne, Sullivan, Lackawanna, Union, Northumberland, Luzerne and Carbon.

District No. 2, Northwest.—Andrew Story, Meadville; Rural Route No. 3; composing counties of Erie, Warren, Potter, Venango, Elk, Clinton, Butler, Jefferson, Crawford, McKean, Mercer, Forest, Cameron, Lawrence, Clarion and Centre.

District No. 3, Southwest.—R. J. Nedimyer, St. Lawrence; composing counties of Beaver, Armstrong, Cambria, Huntingdon, Somerset, Washington, Fayette, Allegheny, Indiana, Blair, Westmoreland, Mifflin, Greene, Bedford and Clearfield.

District No. 4, Southeast.—A. B. Lehman, Fayetteville; composing counties of Snyder, Perry, Lebanon, Berks, Northampton, Franklin, York, Chester, Bucks, Juniata, Dauphin, Schuylkill, Lehigh, Adams, Lancaster, Delaware, Montgomery and Philadelphia.

EXECUTIVE BOARD.

W. A. Gardner, Chairman, Andrews' Settlement.

G. W. Kilmer, Secretary, Towanda.

A. J. Robinson, Greenville, two years.

W. K. Salisbury, Lawsville Centre, two years.

O. F. Berger, Shartlesville.

CONSTITUTION AND BY-LAWS OF THE PENNSYLVANIA STATE FARMERS' ALLIANCE AND INDUSTRIAL UNION.

DECLARATION OF PURPOSES.

Whereas, The general condition of our country imperatively demands unity of action on the part of the farming and laboring classes, reformation in economy, and the dissemination of principles best calculated to encourage and foster agricultural and mechanical pursuits, encouraging the toiling masses, leading them in the road to prosperity, and providing a just and fair remuneration for labor, a just exchange for our commodities, and the best means of securing to the laboring classes the greatest amount of good; we hold to the principle that all overpowering monopolies are dangerous to the best interests of our country, tending to enslave a free people, and subvert and finally overthrow the great principles purchased to the fathers of American liberty. We, therefore, adopt the following as our declaration of principles:

1. To labor for the education of the agricultural classes in the science of economical government, in a strict non-partisan spirit, and to bring about a more perfect union of said classes.

2. That we demand equal rights, and exact justice to all and special favors to none.

3. To endorse the motto, "In things essential, unity; and in all things, charity."

4. To develop a better state, mentally, morally, socially and financially.

5. To constantly strive to secure entire harmony and good will to all mankind, and brotherly love among ourselves.

6. To suppress personal, local, sectional and national prejudices; all unhealthy rivalry, and all selfish ambition.

7. The brightest jewels which it garners are the tears of widows and orphans, and its imperative commands are to visit the homes where lacerated hearts are bleeding; assuage the sufferings of a brother or sister; bury the dead, care for the widows and educate the orphans; to exercise charity towards offenders; to construe words and deeds in their most favorable light, granting honesty of purpose and good intention to others; and to protect the principles of the Alliance unto death. Its laws are reason and equity; its cardinal doctrines inspire purity of thought and life; its intention is, "on earth peace, and good will toward men."

8. We are, furthermore, more than ever profoundly impressed with the importance of unity of action in practice, as well as theory, in order that the true interests of the country, as well as the town and city, may be completely subserved.

PENNSYLVANIA STATE COLLEGE.

SCHOOL OF AGRICULTURE.1902.

FACULTY.

GEORGE W. ATPERTON, LL. D., President.

HENRY PRENTISS ARMSBY, Ph. D., Dean,

Lecturer on Stock Feeding.

WILLIAM A. BUCKHOUT, M. S.,

Professor of Botany and Horticulture.

WILLIAM FREAR, Ph. D.,

Professor of Agricultural Chemistry.

GEORGE C. WATSON, B. Agr., M. S.,

Professor of Agriculture and Superintendent of Correspondence Courses.

LEONARD PEARSON, B. S., V. M. D.,

Special Lecturer on Veterinary Science.

GEORGE C. BUTZ, M. S.,

Assistant Professor of Horticulture.

HARRY HAYWARD, M. S.,

Assistant Professor of Dairy Husbandry.

C. A. BROWNE, JR., Ph. D.,

Instructor in Agricultural Chemistry.

F. I. MAIRS, M. S.,

Instructor in Animal Industry.

OTHER INSTRUCTORS.

I. THORNTON OSMOND, M. S., M. A.,

Professor of Physics.

LOUIS E. REBER, M. S.,

Professor of Mechanics and Mechanical Engineering.

GEORGE GILBERT POND, M. A., Ph. D.,

Professor of Chemistry and Director of the Chemical Laboratories.

FRED. E. FOSS, B. S., M. A.,

Professor of Civil Engineering.

JOSEPH M. WILLARD, B. A.,

Professor of Mathematics.

FRED. LEWIS PATTEE, M. A.,

Professor of English and Rhetoric.

HARVEY A. SURFACE, M. S.,

Professor of Zoology.

MARSHMAN E. WADSWORTH, Ph. D.,

Professor of Mining and Geology.

CARL D. FEHR, M. A.,

Assistant Professor of German.

ANNA E. REDIFER,

Assistant Professor of Industrial Art and Design.

IRVING L. FOSTER, M. A.,

Assistant Professor of Romance Languages.

THE PENNSYLVANIA STATE COLLEGE AGRICULTURAL EXPERIMENT STATION.

1902.

ADVISORY COMMITTEE OF BOARD OF TRUSTEES.

THE HON. JOHN A. WOODWARD, Chairman,	Howard.
JOEL A. HERR, Esq.,	Cedar Springs.
H. V. WHITE, Esq.,	Bloomsburg.
SAMUEL R. DOWNING, Esq.,	Goshenville.
GEO. W. ATHERTON, LL. D., President of the College,	State College.
HENRY PRENTISS ARMSBY, Ph. D., Secretary of the Committee.	

OFFICERS AND ASSISTANTS.

THE PRESIDENT OF THE COLLEGE.

HENRY PRENTISS ARMSBY, Ph. D.,	Director.
WILLIAM FREAR, Ph. D.,	Vice Director and Chemist.
WILLIAM A. BUCKHOUT, M. S.,	Botanist.
GEORGE C. BUTZ, M. S.,	Horticulturist.
GEORGE C. WATSON, M. S.,	Agriculturist.
HARRY HAYWARD, B. S.,	Dairy Husbandry.
WILLIAM C. PATTERSON,	Superintendent of Farm.
MISS JULIA CATHARINE GRAY,	Secretary.
J. AUGUST FRIES, B. S.,	Assistant Chemist.
CHARLES ALBERT BROWNE, Jr., M. A.,	} Assistant Chemists.
CASSIUS W. NORRIS,	
JAMES P. PILLSBURY,	Assistant in Horticulture.
MILTON S. McDOWELL, M. S.,	} Assistant Chemists.
CHARLES P. BEISTLE, B. S.,	
MELVIN H. PINGREE, B. S.,	
MISS MARY GARDNER,	Stenographer.
WM. T. CARTER, B. S.,	Fellow in Agricultural Chemistry.
.....,	Fellow in Dairy Husbandry.

Telegraph, Postoffice, Railroad and Express Station
STATE COLLEGE, CENTRE COUNTY, PA.

Telephone Connection.

☞ The bulletins and reports of the Station will be mailed regularly, free of charge, to all residents of the State who request it, so far as the supply will permit. Address, Director of Experiment Station, State College, Centre County, Pa.

Visitors will be welcomed at all times and given every opportunity to inspect the Station and all its departments.

PENNSYLVANIA FORESTRY ASSOCIATION.

1902.

President, John Birkinbine.

Richard Wood,

James C. Haydon,

Albert Lewis,

Howard M. Jenkins.

General Secretary, Dr. Joseph T. Rothrock.

Corresponding Secretary, Mrs. John P. Lundy.

Recording Secretary, F. L. Bitler.

Treasurer, Charles E. Pancoast.

COUNCIL.

At Large, Mrs. Brinton Cox.

Dr. Alfred L. Elwyn,

Charles Hewett.

Allegheny county, Hon. Geo. W. Guthrie,

George M. Lehman,

Henry Phipps,

Wm. A. Baldwin,

Wm. Wade.

Armstrong county, R. M. Moor.

Beaver county, J. S. Duss.

Berks county, Mrs. George Brooke.

J. H. Sternbergh.

Blair county, Harvey Linton.

Bradford county, C. S. Mamice.

Bucks county, Mrs. Geo. T. Heston.

Alfred Paschall,

Dr. Howard Pursell.

Butler county, Wm. Campbell, Jr.

Cambria county, Hartley C. Welle.

Carbon county, M. S. Kemmerer.

Centre county, Prof. Wm. A. Buckhout.

Chester county, Henry T. Coates.

Wm. S. Kirk.

Samuel Marshall.

Clarion county, Jos. M. Fox.

Clearfield county, John E. DuBois.

Clinton county, Wm. P. Mitchell.

Columbia county, John R. Townsend.

Crawford county, Geo. F. Brown.

Cumberland county, J. C. Fuller.

- Dauphin county, Miss Mira Lloyd Dock,
E. C. Felton.
- Delaware county, Charles Potts,
L. Frissell,
Theo. D. Rand,
Chas. S. Wells.
- Elk county, Hon. George R. Dixon.
- Erie county, Isaac B. Brown.
- Fayette county, Hon. Nathaniel Ewing.
- Forest county, Samuel D. Irwin.
- Franklin county, Col. T. B. Kennedy.
- Huntingdon county, Mrs. William Dorris.
- Jefferson county, J. C. Cochran, M. D.
- Lackawanna county, G. Edgar Dean, M. D.,
Hon. L. A. Watres.
- Lancaster county, J. H. Baumgardner,
Hon. C. C. Kauffman.
- Lawrence county, Frank Carpenter.
- Lebanon county, Mrs. Bertham Dawson Coleman.
- Lehigh county, Dr. William Herbst.
- Luzerne county, Mrs. Eckley B. Coxé,
Col. R. Bruce Ricketts,
Gen. Paul A. Oliver,
I. A. Stearns.
- Lycoming county, Dr. B. H. Detwiler,
Hon. J. Henry Cochran.
- McKean county, F. H. Newell.
- Mercer county, Jonas J. Pierce.
- Montgomery county, Dr. J. M. Anders,
B. Witman Dambly,
Dr. H. M. Fisher,
Dr. J. Newton Hunsberger,
Prof. J. Shelly Weinberger,
Dr. Samuel Wolfe.
- Montour county, Isaac X. Grier.
- Northampton county, Dr. Thomas M. Drown,
A. S. Schropp.
- Northumberland county, G. R. Van Alen.
- Perry county, Mrs. John Wister.
- Philadelphia county, Hon. W. N. Ashman,
Henry Budd,
Henry Howson,
Joseph W. Johnson,
J. Rodman Paul,
Albert B. Weimer,
Dr. W. P. Wilson.
- Pike county, Arthur M. Adams.
- Potter county, Arthur B. Mann.

Schuykill county, Wm. L. Sheaffer,
Heber S. Thompson.

Somerset county, H. D. Moore, M. D.

Sullivan county, Hon. B. W. Jennings.

Susquehanna county, Edgar A. Turrell.

Tioga county, Charles Tubbs.

Union county, Albert A. Leiser.

Venango county, James D. Hancock.

Warren county, H. H. Cumings.

Washington county, Wm. Parkinson Warne.

Wayne county, Alonzo T. Searle.

Westmoreland county, Hon. Lucien W. Doty.

Wyoming county, James W. Piatt.

York county, Dr. I. C. Gable.

LIST OF FARMERS' CLUBS IN THE STATE.

County.	Name of Club.	Name and Address of President.	Name and Address of Secretary.
Allegheny,	Gardeners' Association,	M. C. Dunlevy, Carnegie,	J. M. Handersheld, Green Tree,
	Farmers' Association,	M. F. Fife, Upper St. Clair,	Wm. Caldwell, Upper St. Clair,
Berks,	Oakdale,	Thos. J. C. Morrow, Hickman,	P. F. Humell, Oakdale,
Bradford,	Farmers' Union,	E. M. Zerr, Gelger's Mills,	H. C. Hoh, Bradsboro,
Chester,	Orwell's Farmers,	C. M. Beers, Orwell,	Jas. E. Eastman, Orwell,
	West Grove,	Jos. T. Phillips, West Grove,	I. R. Chambers, Toughkenamon,
	Practical Farmers,	James Keech, Thorndale,	Mrs. Clara Webster, Hopewell,
	Doe Run,	G. C. Maule, Gum Tree,	Emma Maule, Rosewick,
Cumberland,	McCormick's,	James McCormick, Harrisburg,	James Coble, Shremanstown,
Franklin,	Farmers' Association,	S. S. Leady, Marlon,	D. C. Croft, Marlon,
Jefferson,	Washington Township,	Abel Thompson, Allens Mills,	J. F. Morrison, Allens Mills,
Lancaster,	Octoraro,	Edwin Chamblen, Chatham,	Carrie W. Chambers, Chatham,
	Fulton,	Neale Hambleton, Goshen,	T. C. Evans, Furniss,
Lawrence,	Farmers' Institute,	Samuel McCreary, Nashamooke Falls,	H. M. Grigsby, New Castle,
Lycoming,	Muncy Valley,	E. W. McMichael, Hughesville,	A. C. Henry, Hughesville,
Lehigh,	Industrial Union,	John K. Fetherolf, Jacksonsville,	W. H. Lang, Jacksonsville,
	Hosensack,	John Bitting, Hosensack,	William Roeder, Hosensack,
	Limeport,	William Laubach, Lenark,	Thomas Ott, Limeport,
	Buckhorn,	Milton Zimmerman, Selbstown,	Charles Schlenker, Selbstown,
	Pioneer Branch,	E. S. Rabenold, Wolferts,	C. Reichard, Wolferts,
Montgomery,	Hoffmansville,	Uriah Schuler, Orefield,	Milton Follers, Orefield,
	Horsham,	Howard Williams, Horsham,	William Smith, Pottstown,
Northumberland,	Farmers' Union,	Jesse S. Kreibel, Worcester,	W. W. John, Bear Gap,
Potter,	Elysburg,	J. H. Hoberman, Pottstown,	Prof. Geo. Sterns, Harford,
	Farmers' Association,	C. C. McWilliams, Elysburg,	P. C. Davis, Dundaff,
Clifford,	Hanover Township,	John Crooks, Mardoockville,	W. H. Englefield, Frankfort Springs,
Washington,	Citizens' Co-operation,	John G. Galley, Finleysville,	T. J. McClelland, Finleysville,
York,	Warrington,	C. Z. March, Rossyille,	M. L. Brennenman, Wellsyille,

List of County and Local Agricultural Societies, with Names and Addresses of Presidents and Secretaries and Dates for Holding Fall Exhibitions of 1901, Etc.

[Those marked with an * are represented in the Board of Agriculture by elected members.]

County.	Corporate Name of Society.	Name and Address of President.	Name and Address of Secretary.
Adams.*	Pennsylvania State Agricultural Society.	Hiram Young, York, Pa.	J. P. Nisley, Hummelstown.
Allegheny.*	State Horticultural Association.	Howard A. Chase, 1430 S. Penn St., Philadelphia.	Enos B. Engle, Waynesboro.
Armstrong.*	Grangers' Plenic Exhibition.	R. H. Thomas, Mechanicsburg.	H. S. Mohler, Mechanicsburg.
Armstrong.	Mt. Gretna Agricultural, Mechanical and Industrial Exposition.	J. H. Redsecker, Lebanon.	S. F. Helman, Helman Dale.
Beaver.*	Patrons of Husbandry Exhibition.	L. Rhone, Chairman, Centre Hall.	G. H. St. John, Meadville.
Bedford.*	Pennsylvania State Dairymen's Association.		
Berks.*	Adams County Agricultural Association.	Jno. F. Bushey, Arendtsville.	A. I. Wellner, Arendtsville.
	Clinton Agricultural Association.	S. S. Ferguson, Clinton.	J. S. Burns, Clinton.
	Dayton Agricultural and Mechanical Association.	W. C. Marshall, Dayton.	E. E. Lawson, Dayton.
	Parker Tri-County Fair Association.		S. W. Coe, Parkers Landing.
	Kittanning Fair Association.	G. W. Reese, Kittanning.	T. M. McConnell, Kittanning.
	Beaver County Agricultural Society.	G. W. Muehrli, Beaver.	J. C. Martin, Beaver.
	Mill Creek Valley Agricultural Association, Limited.	H. W. Nelson, Hookstown.	R. M. Swaney, Hookstown.
	Bedford County Agricultural Society.	David W. Lee, Bedford.	Wm. I. Eicholtz, Bedford.
	Agricultural and Horticultural Association of Berks County.	Jas. McQuinn, Geiger's Mills.	Cyrus T. Fox, Reading.
Parks.	Keystone Agricultural and Horticultural Society.	Wm. F. Stimmel, Kutztown.	J. B. Esfer, Kutztown.
Blair.*	Blair County Agricultural Society.	John S. Vipond, Hollidaysburg.	Frank H. Fay, Hollidaysburg.
Bradford.*	Bradford County Agricultural Society.	Geo. W. Kilmer, Monroeton.	Chas. M. Culver, Towanda.
Bradford.	Union Agricultural Association.	John H. Brown, Cedar Lodge.	C. D. Lerrah, Canton.
Bradford.	Troy Agricultural Society.	R. A. Long, Troy.	Chas. L. Fellows, Troy.
Butler.*	Butler County Agricultural Society.	W. H. H. Riddle, Butler.	W. F. Roessing, Butler.
Cambria.*	Ebensburg Agricultural Society.	Edw. James, Ebensburg.	F. C. Shaubaugh, Ebensburg.
Cambria.	Gambria County Agricultural Association.		J. V. Maucher, Carrolltown.
Cambria.	Tri-County Agricultural and Dairying Park Association.	H. J. Krumenacker, Nicktown.	J. H. Lavine, Johnstown.
Carbon.*	Carbon County Agricultural Society.	F. X. Humle, Emporium.	N. A. Ostrum, Emporium.
Carbon.	Centre County Industrial Society.	Henry Miller, Lehighton.	Chas. E. Brinkman, Lehighton.
Centre.	Centre County Agricultural Exhibiting Company.	Ellis L. Oavis, Bellefonte.	John Blanchard, Bellefonte.
Chester.*	Chester County Agricultural Society.	Jesse J. Hickman, Westtown.	Barclay Lear, West Chester.
Chester.	Oxford Agricultural Society.	Wm. H. Hoag, Kirkwood.	Harry C. Thomas, Oxford.
Clarion.*	Clarion County Fair Association.	George Yankers, Clarion.	S. S. Laughlin, Clarion.
Clarion.	Clarion County Agricultural Society.	Peter Garphart, Curwensville.	R. E. Shaw, Clarion.
Clinton.*	Clinton County Agricultural Society.	Joel A. Herr, Cedar Springs.	J. R. Porter, Mackeyville.
Columbia.*	Columbia County Agricultural, Horticultural and Mechanical Association.	E. H. Sloan, Orangeville.	A. N. Yost, Bloomsburg.
Crawford.*	Central Crawford Agricultural Society.	Clark D. Eckels, Cambridge Springs.	Albert S. Faber, Cambridge Springs.
Cumberland.*	Cumberland County Agricultural Society.	Chas. H. Mullin, Mt. Holly Springs.	W. H. McCrea, Carlisle.
Dauphin.*	Gratz Agricultural and Horticultural Association.	A. G. Stanley, Lykens.	J. W. Hoffman, Gratz.

Dauphin,	Agricultural Society of Dauphin County,	John J. Hargest, Harrisburg,	Gabriel Heister, Harrisburg,
Delaware,	Delaware County Agricultural Society,	J. Milton Lutz, Manoa,	John H. Paschall, Ward,
Edinboro,	Edinboro Agricultural Society,	E. D. Kenyon, Edinboro,	J. J. McWilliams, Edinboro,
Erle,	Wattsburg Agricultural Society,	Wm. M. Thompson, Uniontown,	A. L. Phelps, Wattsburg,
Fayette,	Big Cove Agricultural Society of Fulton County,	Wm. M. Kendall, McConnellsburg,	Wm. W. Parrish, Uniontown,
Fulton,	Waynesburg Fair Association,	John T. Rogers, Waynesburg,	John S. Carter, Waynesburg,
Greene,	Greene County Agricultural and Mechanical Society,	J. L. Smith, Carmichaels,	C. W. Barkman, Carmichaels,
Greene,	Richhill Agricultural Society,	Stephen Knight, Wind Ridge,	O. E. Burns, Wind Ridge,
Huntington,	Huntingdon County Agricultural Society,	M. F. Jamison, Indiana,	W. A. Neff, Warriors Mark,
Indiana,	Indiana County Agricultural Society,	Ira J. Campbell, Punxsutawney,	David Blair, Indiana,
Jefferson,	Punxsutawney Fair Association,	T. K. Beaver, Academia,	Benj. Reoon, Punxsutawney,
Junata,	Junata County Agricultural Society,	H. W. Northup, Glenburn,	Wm. Hertzler, Port Royal,
Lackawanna,	Lackawanna County Agricultural Society,	Mr. Houselander, Dolton,	Wm. Streater, Chinchilla,
Lackawanna,	North Abington and Glenburn Farmers' Club, .....	.....	Wm. Smith, Dolton,
Lancaster,	Lancaster County Agricultural Society, .....	.....	Isaac Ellis, Glenburn,
Lancaster,	Lancaster County Agricultural and Horticultural Society, .....	.....	Simon L. Brandt, Marietta,
Lawrence,	Lawrence County Agricultural and Horticultural Society, .....	.....	F. R. Diffenderfer, Lancaster,
Lebanon,	Lebanon Valley Fair Association, .....	.....	H. W. Grigsby, New Castle,
Lebanon,	Lebanon County Agricultural and Horticultural Asso., .....	.....	W. B. Means, Lebanon,
Lehigh,	Lehigh County Agricultural Society, .....	.....	S. P. Hellman, Hellmandale,
Luzerne,	Dallas Union Agricultural Association, .....	.....	Harry B. Schall, Allentown,
Lycoming,	Muncy Valley Farmers' Club, .....	.....	Will Norton, Dalls,
McKean,	McKean County Agricultural Society, .....	.....	A. C. Henry, Hughesville,
McKean,	Agricultural and Breeders' Society, .....	.....	J. B. Colcord, Fort Allegany,
Mercer,	Mercer County Agricultural Society, .....	.....	James Quirk, Smethport,
Mercer,	Mercer Central Agricultural Society, .....	.....	Geo. H. Fowler, Stoneboro,
Mifflin,	Mifflin County Agricultural Society, .....	.....	J. B. Mowry, Mercer,
Monroe,	Monroe County Agricultural Society, .....	.....	A. T. Hamilton, Lewistown,
Montour,	Montour County Agricultural Society, .....	.....	H. L. La Bar, Stroudsburg,
Northampton,	Northampton County Agricultural Association, .....	.....	Wm. Kas-west, Danville,
Northampton,	Pennsylvania State Fair Association, .....	.....	John R. Rheinheimer, Nazareth,
Northumberland,	Milton Driving Park and Fair Association, .....	.....	H. A. Groman, Bethlehem,
Perry,	Perry County Agricultural Society, .....	.....	Edwin Paul, Milton,
Philadelphia,	Pennsylvania Horticultural Society, .....	.....	H. C. F. Stephens, Newport,
Schuylkill,	Orwigsburg Agricultural and Horticultural Society, .....	.....	David Rust, Horticultural Hall, Philadelphia,
Somerset,	Somerset County Agricultural Society, .....	.....	A. E. Brown, Orwigsburg,
Sullivan,	Sullivan County Agricultural Society, .....	.....	H. T. Hoffman, Jammers,
Susquehanna,	Susquehanna County Agricultural Society, .....	.....	O. N. Molyneux, Milview,
Susquehanna,	Harford Agricultural Society, .....	.....	W. A. Titworth, Matrose,
Tioga,	Cowanesque Valley Agricultural Society, .....	.....	E. E. Jones, Harford,
Tioga,	Smythe Park Association, .....	.....	J. W. Smith, Westfield,
Tioga,	Tioga County Pomona Grange, .....	.....	W. P. Austin, Mansfield,
Union,	Union County Agricultural Society, .....	.....	H. Rohlyer, Balsam,
Union,	Oil City Fair and Trotting Association, .....	.....	C. Dale Wolfe, Bucknell,
Venango,	Western Pennsylvania Agricultural Association, .....	.....	L. S. Hindorfer, Oil City,
Washington,	Union Agricultural Association, .....	.....	Jas. S. Forsythe, Washington,
Wayne,	Wayne County Agricultural Society, .....	.....	R. P. Stevenson, Burgettstown,
Westmoreland,	Westmoreland Agricultural Society, .....	.....	E. W. Gammell, Bathany,
Wyoming,	Wyoming County Agricultural Society, .....	.....	W. F. Holtz, Greensburg,
York,	York County Agricultural Society, .....	.....	M. Reynolds, Funkhannock,
York,	Hanover Agricultural Society, .....	.....	Edw. C. Chapin, York,
York, .....	.....	.....	M. O. Smith, Hanover,

Note.—Where dates, etc., are omitted, no replies to requests for same were received by this Department.

List of County and Local Agricultural Societies, with Names and Addresses of Presidents and Secretaries and Dates for Holding Fall Exhibitions of 1901, Etc.—Continued.

[Those marked with an * are represented in the Board of Agriculture by elected members.]

County.	Corporate Name of Society.	Attendance 1900.	Race track.	Premiums.		Where Held 1901.	When Held 1901.
				Paid 1900.	Offered 1901.		
	Pennsylvania State Agricultural Society,	35,311	Yes, .....	.....	.....	Not selected,	Sept. or Oct.
	State Horticultural Association, .....	.....	.....	.....	.....	.....	No fair
	Grangers' Picnic Association,	120,000	No,	\$4,354 13	.....	Williams Grove, ..	Aug. 26-31.
	Mt. Gretna Agricultural, Mechanical and Industrial Exposition, .....	.....	No, .....	.....	.....	Mt. Gretna,	Aug. 19-23.
	Patrons of Husbandry Exhibition,	10,000	No, .....	.....	Pay none,	Grange Park, Centre Hall,	Sept. 16-20.
Adams,*	Pennsylvania State Dairymen's Association, .....	.....	.....	.....	.....	.....	.....
Allegheny,*	Adams County Agricultural Association, .....	.....	.....	.....	.....	.....	No fair.
Armstrong,*	Clinton Agricultural Association, .....	.....	1/4 mile,	350 00	.....	Clinton,	Not yet decided
	Dayton Agricultural and Mechanical Association,	13,000	1-3 mile,	1,500 00	.....	Dayton,	Sept. 24-25.
Armstrong,	Parker Tri-County Fair Association,	30,000	1/2 mile, .....	.....	.....	.....	.....
Armstrong,	Kittanning Fair Association, .....	.....	No,	5,100 00	\$5,000 00	Kittanning,	Aug. 20-23.
Beaver,*	Beaver County Agricultural Society, .....	.....	1-3 mile,	2,155 00	.....	Beaver,	Not decided.
	Mill Creek Valley Agricultural Association, Limited, .....	.....	.....	.....	.....	Hookstown,	Aug. 20-22.
Bedford,*	Bedford County Agricultural Society,	5,000	1/2 mile,	1,000 00	1,000 00	Bedford,	Oct. 1-3.
Berks,*	Agricultural and Horticultural Association of Berks County,	40,000	1/2 mile,	2,000 00	5,000 00	Reading,	Oct. 1-4.
Berks,	Keystone Agricultural and Horticultural Society,	20,000	1-3 mile,	1,200 00	1,800 00	Kutztown,	Sept. 17-20.
Blair,*	Blair County Agricultural Society,	15,000	1/2 mile,	Including race purses, \$1,-500 00.	Same as 1900,	Holidaysburg,	Sept. 10-13.
Bradford,*	Bradford County Agricultural Society,	25,000	1/2 mile,	1,500 00	\$2,800 premiums \$850 purses	F. Towanda Fair Grounds,	Sept. 24-27.
Bradford,*	Union Agricultural Association,	3,000	1/2 mile,	316 17	1,200 00	Canton,	Sept. 10-12.
Bradford,	Troy Agricultural Society,	6,000	1/2 mile,	661 40	1,400 00	Troy,	Sept. 17-20.
Butler,*	Butler County Agricultural Society,	23,000	1/2 mile,	2,528 00	4,000 00	Butler,	Sept. 3-6.
Cambria,*	Elphinstown Agricultural Society,	8,000	1/2 mile,	1,200 00	1,500 00	Ebensburg,	Aug. 27-30.
Cambria,	Cambria County Agricultural Association, .....	.....	1/2 mile, .....	.....	.....	Carrolltown,	Sept. 3-6.
	Tri-County Agricultural and Driving Park Association, .....	.....	.....	.....	.....	.....	.....

Cameron,*	Cameron County Agricultural Society.	8,000	1/2 mile.	550 00	Not yet made.	Leighton,	No fair.
Carlton,	Carlton County Industrial Society.	10,000	1/2 mile.	\$4,500 00		Bellefonte.	Sept. 17-20.
Centre,	Centre County Agricultural Exhibiting Com- pany.						Sept. 10-13.
Chester,*	Chester County Agricultural Society.	6,000	No.	No fair.		Oxford,	No fair.
Chester,	Oxford Agricultural Society.		1/2 mile.	\$1,000 00 and speed pre- miums.	Same as 1900.		Sept. 25-27.
Clarion,*	Clarion County Fair Association.	12,000	1/2 mile.			Clarion,	Sept. 3-6.
Clearfield,*	Clearfield County Agricultural Society.		1/2 mile.				No fair.
Clinton,*	Clinton County Agricultural Society.		No.				No fair.
Columbia,*	Columbia County Agricultural, Horticultural and Mechanical Association.	25,000	1/2 mile.	5,100 00	6,000 00	Bloomsburg,	Oct. 8-11.
Crawford,*	Central Crawford Agricultural Society.	12,000	1-3 mile.	800 74		Cambridge Springs	Aug. 27-30.
Cumberland,*	Cumberland County Agricultural Society.	20,000	1/2 mile.	4,000 00	4,000 00	Carlisle,	Sept. 24-27.
Dauphin,*	Gratz Agricultural and Horticultural Associa- tion.		1/2 mile.			Gratz,	Aug. 20-23.
Dauphin,	Agricultural Society of Dauphin County.						
Delaware,*	Delaware County Agricultural Society.						No fair.
Erie,*	Edinboro Agricultural Association.	40,000	1/2 mile.	150 00	550 00	Edinboro,	No fair.
Erie,*	Wattsburg Agricultural Society.						Aug. 13-16.
Fayette,*	Fayette Fair Association.	12,000	1/2 mile.	2,000 00	2,500 00	Uniontown,	Oct. 1-4.
Fulton,*	Big Cove Agricultural Society of Fulton County.		No.				No fair.
Greene,*	Waynesburg Fair Association.	15,000	1/2 mile.			Waynesburg,	Sept. 17-20.
Greene,	Greene County Agricultural and Mechanical Society.		1-3 mile.	468 00	600 00	Carmichaels,	Oct. 2-3.
Greene,	Richhill Agricultural Society.	1,500	1-3 mile.	400 00	500 00	Wind Ridge,	Sept. 4-5.
Huntingdon,*	Huntingdon County Agricultural Society.						
Indiana,*	Indiana County Agricultural Society.		1/2 mile.			Indiana	Sept. 10-13.
Jefferson,*	Punxsutawney Fair Association.	18,000	1/2 mile.	8,000 00	8,000 00	Punxsutawney	Aug. 27-30.
Junata,*	Junata County Agricultural Society.	10,000	1/2 mile.	1,500 00	Not fixed.	Port Royal,	Sept. 11-13.
Lackawanna,*	Lackawanna County Agricultural Society.						
Lackawanna,*	Maitland Fair Association.		1/2 mile.	2,000 00	2,000 00	Wallisville,	Sept. —
Lackawanna,	North Abington and Glenburn Farmers' Club.						
Lancaster,*	Lancaster County Agricultural Society.						
	Lancaster County Agricultural and Horticul- tural Society.						
Lawrence,*	Lawrence County Agricultural and Horticul- tural Society.		No.			New Castle,	Sept. 26-27.
Lebanon,*	Lebanon Valley Fair Association.		1/2 mile.			Lebanon,	Sept. 3-6.
Lebanon,	Lebanon County Agricultural and Horticul- tural Association.						No fair.
Lehigh,*	Lehigh County Agricultural Society.	20,000	1/2 mile.	14,000 00	20,000 00	Allentown,	Sept. 23-28.
Luzerne,*	Dallas Union Agricultural Society.	15,000	1/2 mile.	1,500 00		Dallas	Oct. 1-4.
Lycoming,*	Muncy Valley Farmers' Club	12,000	1/2 mile.	1,500 00	1,850 00	Hughesville,	Sept. 17-20.
McKean,*	McKean County Agricultural Society.						
McKean,*	Agricultural and Breeders' Society.						
McKean,	Mercer County Agricultural Society.	28,000	1/2 mile.	Including speed 3,600 00	4,500 00	Stoneboro,	Oct. 1-3.
Mercer,*	Mercer Central Agricultural Society.		1/2 mile.	2,300 00	2,300 00	Mercer,	Sept. 24-26.
Mifflin,*	Mifflin County Agricultural Society.	12,000	No.	No fair.			No fair.
Monroe,*	Monroe County Agricultural Society.						
Montour,*	Montour County Agricultural Society.		1/2 mile.			Danville,	Oct. —
Northampton,*	Northampton County Agricultural Association.	60,000	1/2 mile.	4,223 58	5,000 00	Nazareth,	Oct. 1-4.

List of County and Local Agricultural Societies, with Names and Addresses of Presidents and Secretaries and Dates for Holding Fall Exhibitions of 1901, Etc.—Continued.

County.	Corporate Name of Society.	Attendance 1900.	Race track.	Premiums.		Where Held 1901. When Held 1901.
				Paid 1900.	Offered 1901.	
Northampton,	Pennsylvania State Fair Association,	45,000	1/2 mile,...	2,600 00	4,000 00	Sept. 10-13.
Northumberland, •	Milton Driving Park and Fair Association,	40,000	1/2 mile,...	1,600 00	1,600 00	Oct. 1-4.
Perry, •	Perry County Agricultural Society,	6,000	1/2 mile,...	Including races \$1,600.00.	Including race purses, \$18.00.	Sept. 17-20.
Philadelphia, •	Pennsylvania Horticultural Society,	2,000		\$1,900 00	\$1 950 00	Nov. 12-16.
Schuylkill, •	Orwigsburg Agricultural and Horticultural Society.	15,000	1/2 mile,...	400 00	Not decided,....	Sept. 10-13.
Somerset, •	Somerset County Agricultural Society,	5,000	No,	272 05		No fair.
Sullivan, •	Sullivan County Agricultural Society,	5,000	No,	800 00	600 00	Oct. 2-4.
Susquehanna, •	Susquehanna County Agricultural Society,	5,000	No,	800 00	800 00	Oct. 1-2.
Susquehanna, •	Harford Agricultural Society,	6,000	No,	950 00	1,000 00	Sept. 25-26.
Toga, •	Cowan-sque Valley Agricultural Society,	15,000	1/2 mile,...	1,500 00	2,000 00	Sept. 9-13.
Toga, •	Smythe Park Association,		No,			Sept. 24-27.
Toga, •	Tioga County Pomona Grange,		1/2 mile,...	No fair,		Not fixed.
Union,	Union County Agricultural Society,	15,000	1/2 mile,...	Race, \$2,150; premi-ums, \$900.00.	Same as 1900,....	Sept. 24-27.
Yenango, •	Oil City Fair and Trotting Association,					
Washington, •	Western Pennsylvania Agricultural Association,	11,250	1/2 mile,...	Premiums and purses, \$4,- 689.88.	Premiums and purses, \$12 000.	Sept. 24-27.
Washington,	Union Agricultural Association,	12,000	1-3 mile,...	3,479 65	4,000 00	Oct. 1-3.
Wayne, •	Wayne County Agricultural Society,	7,500	1/2 mile,...	1,250 00	1,800 00	Sept. 24-26.
Westmoreland, •	Westmoreland Agricultural Society,	11,000	1/2 mile,...	2,800 00	Not decided,....	Sept. 17-20.
Wyoming, •	Wyoming County Agricultural Society,	6,000	1/2 mile,...	1,000 00	1,000 00	Sept. 18-20.
York,	York County Agricultural Society,	50,000	1/2 mile,...	Premiums, \$4,- 674.30; speed, \$3,195.00.	6,500 00	Oct. 7-11.
York,	Hanover Agricultural Society,	22,000	1/2 mile,...	1,500 00	2,000 00	Sept. 17-20.

Note.—Where dates, etc., are omitted, no replies to requests for same were received by this Department.

THE PENNSYLVANIA STATE POULTRY ASSOCIATION.

OFFICERS FOR 1902.

PRESIDENT.

Norris G. Temple, Pocopson.

VICE PRESIDENT.

A. G. Arnold, Dillsburg.

SECRETARY.

Theo. F. Jager, Lebanon.

TREASURER.

Dr. E. H. Witmer, Neffsville.

BOARD OF DIRECTORS.

Prof. Geo. C. Watson, State College.
 J. Emlen Smith, Chestnut Hill.
 Wm. H. Kendig, Newville.
 Chas. T. Cornman, Carlisle.
 J. E. Redcay, Reading.

COMMITTEES.

Executive Committee.

Norris G. Temple, Pocopson.
 Theo. F. Jager, Lebanon.
 Dr. Geo. H. Witmer, Neffsville.
 And Board of Directors.

Legislative Committee.

Norris G. Temple, Pocopson.
 A. G. Arnold, Dillsburg.

THE PENNSYLVANIA STATE POULTRY ASSOCIATION.

Constitution.

ARTICLE I.

The name of the corporation shall be "The Pennsylvania State Poultry Association."

ARTICLE II.

The object of this corporation shall be to encourage and promote improvement in the breeding and the management of poultry, pigeons and game, and the preservation and protection of the latter; to ascertain by experiment and to collect and disseminate reliable and practical information relating thereto; to work in unison with the State Board of Agriculture, and if possible, with all poultry and agricultural societies throughout this State; to recommend competent persons as judges, to furnish advice when called upon and to settle disputes that may occur at poultry shows.

ARTICLE III.

The principal place of business of said corporation shall be in Pocopson, Chester county, with branch offices in Philadelphia, Harrisburg and Carlisle, Pennsylvania.

ARTICLE IV.

The said corporation shall have perpetual existence.

ARTICLE V.

This corporation shall consist of such persons as shall signify in writing their desire to become members and shall pay on application one (\$1) dollar as membership fee and one (\$1) dollar as yearly dues, and shall present their application in writing to the secretary, who shall issue a certificate of membership.

ARTICLE VI.

The officers of this corporation shall be a president, first vice president, secretary, treasurer, and five (5) directors (three-fifths of said directors to be practical poultry raisers) and one (1) vice president for

each county, represented by membership in the corporation, who shall be elected by ballot, by a majority vote of the qualified members at the annual meeting, and shall serve one year, or until their successors are elected.

ARTICLE VII.

The annual meeting of the corporation shall be held in the city of Harrisburg on the first Tuesday preceding the fourth Wednesday in January, each year, at such time and place as the executive committee may direct.

ARTICLE VIII.

Any officer or member may be censured, suspended or expelled from the corporation for neglect of duty, unfair dealing, wilful misrepresentation or dishonesty in matters connected with the objects of the corporation, such censure, suspension or expulsion requiring a vote of all the members present at a meeting called for that purpose, thirty (30) days notice in writing having been given each member by the secretary.

ARTICLE IX.

Any member upon the payment of fifteen (\$15) dollars at any one time shall be constituted a life member and shall be exempt from the payment of any further dues.

STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

OFFICERS FOR 1902.

PRESIDENT.

Howard A. Chase, Philadelphia.

VICE PRESIDENTS.

Calvin Cooper, Bird-in-Hand.

Hon. W. T. Creasy, Catawissa.

M. C. Dunlevy, Carnegie.

RECORDING SECRETARY.

Enos B. Engle, Waynesboro.

CORRESPONDING SECRETARY.

Wm. P. Brinton, Christiana.

TREASURER.

Samuel C. Moon, Morrisville.

CONSTITUTION AND BY-LAWS OF THE STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

Article 1. This society shall be entitled "The State Horticultural Association of Pennsylvania," and its objects shall be the advancement of the science of horticulture and pomology.

Article 2. Any person may become a member of this society by a vote of a majority of the members present at any meeting, and by paying into the treasury the sum of one dollar annually; or the payment of one dollar to the treasurer, at any time, shall constitute membership, and entitle said member to a copy of the proceedings. The payment of ten dollars at one time will constitute life membership.

Article 3. Its officers shall consist of a president, three vice presidents, recording and corresponding secretary, and a treasurer, all of whom shall be elected annually by ballot.

Article 4. The following committees shall be appointed: A committee of five on nomenclature; a committee of three on insects, of whom the professor of entomology shall be chairman; an executive committee, consisting of the elective officers of this association and three of whom, including the president, shall constitute a quorum; and a general fruit committee, consisting of one from each county represented, with a general chairman of the whole, each member of the fruit committee to have the privilege of appointing two assistants.

Article 5. The society may, at any time, elect honorary members.

Article 6. The society may, from time to time, appoint professors on entomology, botany, horticultural chemistry and geology.

Article 7. This constitution may be altered or amended by a vote of two-thirds of the members present at any regular meeting, notice of the proposed amendment, in writing, having been previously given.

Article 8. Seven members shall constitute a quorum for the transaction of business.

BY-LAWS.

Article 1. The committee on nomenclature shall collate and decide the standard and synonymous names of all fruit known in the society with the authorities for each, and report, so far as practicable,

at each regular meeting, and record the same in a book kept for that purpose.

Article 2. The general fruit committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports. Also that the said county committee shall form *ad interim* committees for their respective counties; and further that said *ad interim* committees are hereby authorized to publish the reports in the "Gardener's Monthly," or such other paper, as they may select, the same having been first submitted to the chairman of the general fruit committee for his approval: Provided, That said publication shall be free of expense to the association.

Article 3. The annual meeting of the association shall be held on Tuesday before the third Wednesday of January of each year, at such a place as the executive committee may appoint, at which time the election for officers shall take place; said officers to serve from the close of the meeting at which they are elected to the close of the succeeding annual meeting, at which an exhibition and discussion of fruits shall take place and other business transacted in the following order:

- 1st. Reading of minutes of previous meeting.
- 2d. Roll call and dues collected.
- 3d. Election of officers.
- 4th. Reports of officers.
- 5th. Reports of standing committees.
- 6th. Reports of special committees.
- 7th. Unfinished business of former meeting.
- 8th. New business.

The nomination and election of new members shall be in order at any time during the session.

Article 4. Other meetings may be convened by the executive committee at such time and place as they may appoint.

Article 5. No member who is in arrears for dues shall be eligible for any office, or serve on any standing committee; and any member who shall neglect to pay his dues shall cease to enjoy the privileges of membership.

PROGRAMME OF THE FORTY-SECOND ANNUAL
MEETING OF THE STATE HORTICULTURAL
ASSOCIATION OF PENNSYLVANIA, HELD IN
THE SUPREME COURT ROOM, HARRISBURG,
PA., JANUARY 21 AND 22, 1901.

ORDER OF BUSINESS.

Monday, January 21, 2 P. M.

1. Opening Announcement.
2. Reading of Minutes of Previous Meeting.
3. Roll Call and Collection of Dues.
4. Election of Officers.
5. Reports of Officers.
6. Reports of Standing Committees.
7. Reports of Special Committees.
8. Appointment of Standing Committees.

Monday, January 21, 7.30 P. M.

9. Fruits and Vegetables of Porto Rico,
Dr. Geo. G. Groff, Lewisburg, Pa., late Supt. Public
Instruction in Porto Rico.
10. The Necessity for Additional Legislation for the Protection of
the Fruit Interests of Pennsylvania,
Prof. John Hamilton, Secretary of Agriculture,
Harrisburg, Pa.

Tuesday, January 22, 9. A. M.

11. Reports of Special Committees.
12. Selection of Place for Next Annual Meeting.
13. Report of General Fruit Committee,
H. C. Snively, Chairman, Lebanon, Pa.
14. Experiences in Horticulture,
W. H. Stout, Pinegrove, Pa.

15. Spraying. Its Uses and Abuses,
Calvin Cooper, Bird-in-Hand, Pa.
 16. The Necessity for Nursery Inspection,
Prof. S. B. Heiges, Saxe, Va.
 17. Horticulture Displays at Fairs,
Oliver D. Schock, Hamburg, Pa.
 18. Question Box.
-

Tuesday, January 22, 1.30 P. M.

19. Reports of Committees.
 20. Unfinished and New Business.
 21. Crown Gall of Fruit Trees,
Prof. Geo. C. Butz, State College, Pa.
 22. Landscape Ornamentation,
S. Mendelson Meehan, Germantown, Pa.
 23. The Specialist in Horticulture,
M. C. Dunlevy, Carnegie, Pa.
 24. Shall Pennsylvania Fruits be Represented at the Pan-American
Exposition at Buffalo in 1901?
For General Discussion.
 25. Question Box.
-

Tuesday, January 22, 6.30 P. M.

26. Decorating the Home,
Prof. John Craig, Cornell University, Ithaca, N. Y.
27. Experiences in the Most Remarkable Peach Orchards in
America,
Prof. W. G. Johnson, Associate Editor American
Agriculturist, formerly State Entomologist, Col-
lege Park, Md. Both the above lectures will be
illustrated by views from the magic lantern.

28. Final Remarks and Resolutions.
29. Adjournment.

TOPICS PREPARED FOR DISCUSSION.

30. Where and to Whom Shall I Sell My Fruit to Receive the Best
Net Returns? Shall I Sell at a Fixed Price or on Commission?
31. What is the Best Size Package for Peaches, Pears and Apples?
32. What New Fruits of Promise Have Recently Been Introduced?
33. What is the Outlook for Profit in Chestnut Culture?

34. Have Sulphate of Copper or of Iron, or Bordeaux Mixture Been Used in the Soil to Any Extent as a Preventive or Cure for Yellows?
35. What Part Does Cultivation Play in the Systematic Feeding of Trees and Plants?
36. Should the Size and Shape of Fruit Packages be Regulated by Law, and Should We Have a Law Prohibiting the Dishonest Packing of Fruit?

MEMBERSHIP.

LIFE MEMBERS.

Bartram, J. Hibberd, Milltown, Chester Co.
Brinton, Wm. P., Christiana, Lancaster Co.
Chase, Howard A., 1430 S. Penn Square, Philadelphia.
Chase, Charles T., 1430 S. Penn Square, Philadelphia.
Calder, Dr. James, Harrisburg, Dauphin Co. (deceased).
Cornelius, Robert, Philadelphia.
Creasy, Hon. W. T., Catawissa Columbia Co.
Engle, Henry M., Marietta, Lancaster Co. (deceased).
Engle, John G., Marietta, Lancaster Co.
Engle, Enos B., Waynesboro, Franklin Co.
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Fox, Cyrus T., Reading, Berks Co.
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Heyser, Jacob, Chambersburg, Franklin Co.
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Hiller, Peter C., Conestoga, Lancaster Co. (deceased).
Landis, Israel, Lancaster, Lancaster Co.
Hoopes, Josiah, West Chester, Chester Co.
Landis, Israel, Lancaster, Lancaster Co.
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Reist, John G., Mt. Joy, Lancaster Co.
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Wertz, D. Maurice, Quincy, Franklin Co.

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 Garber, J. B., Columbia, Pa. (deceased).
 Heiges, Prof. S. B., Saxe, Va.
 Meehan, Thomas, Germantown, Pa. (deceased).
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 Parry, William, Parry, N. J. (deceased).
 Rathvon, Prof. S. S., Lancaster, Pa. (deceased).
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 Warder, Dr. John A., North Bend, O. (deceased).
 Wilder, Marshall P., Boston, Mass. (deceased).
 Wickersham, Dr. J. P., Lancaster, Pa. (deceased).
 Willetts, Rev. Dr., Philadelphia, Pa.

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 Herr, Danl. D., Lancaster.
 Herr, Aldus J., Lampeter.
 Hirschinger, John, Enslow.
 Hoke, David, Hanover.
 Hochberg, Wm., Whiteash.
 Hochberg, Jacob, Job.
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 Koons, Dr. P. R., Mechanicsburg.
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 Leinbach, Geo. A., Reading.
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 McGowan, Howard G., Geiger's Mills.
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 Mashey, Mrs. Geo., 6736 Penn Ave., Pittsburg.
 Meehan, Thos. B., Germantown.
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 Moon, Wm. H., Morrisville.
 Moon, Samuel C., Morrisville.
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 Persing, E. E., Sunbury.
 Philip, George, Mt. Lebanon.
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 Rakestraw, Thos., Willowdale.
 Rife, Jacob L., West Fairview.
 Roesler, F., Carnegie.
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 Rupp, Jno. F., Shiremanstown.
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 Rush, J. G., West Willow.
 Schaeffer, Dr. N. C., Lancaster.
 Scheick, Jacob, Carrick.
 Scott, J. W., 3 Union St., Pittsburg.
 Scott, John, Cliffmire.
 Sellers, H. W., Bailey Ave., Pittsburg.
 Seyler, D. M., Basket.
 Scheidy, Danl., Pinegrove.
 Shaffer, Dr. J. A., Carnot.
 Schock, Oliver D., Hamburg.
 Snavelly, H. C., Lebanon.
 Smith, Paul, Beadling.
 Shimer, A. S., Redington.
 Sohn, Henry, Woodlawn.
 Stalze, John R., Library.
 Strachan, Wm., Banksville.
 Stahle, Col. J. A., Emigsville.
 Scholl, Calvin P., Fisherville.
 Shearer, Joseph, Reading.
 Smeych, Danl., Lancaster.
 Stein, Geo. E., East Prospect.
 Sites, J. Landis, Ridge Ave., Harrisburg.
 Stout, Wm. H., Pinegrove.
 Thomas, Joseph W., King-of-Prussia.
 Tucker, O. M., 1114 Franklin Ave., Pittsburg.
 Wagner, Geo. A., Alinda.
 Wakefield, S. M., Redstone.
 Wallize, H. C., Sunbury.
 Wentzel, Aug. L., Reading.
 Williamson, E. C., Morrisville.
 Williams, Dr. C. C., 24 Washington Ave., Pittsburg.
 Wild, Wm., Carrick.
 Woods, T. A., Harrisburg.
 Zigler, Amos, Rowenna.
 Zerr, E. M., Geiger's Mills.

REPORT OF THE FORTY-SECOND ANNUAL MEETING OF THE STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA, WITH SY- NOPSIS OF PAPERS READ.

HELD AT HARRISBURG, PA., JANUARY 21 AND 22, 1901.

The forty-second annual meeting was held in the Supreme Court Room, Harrisburg, Pa., on Monday and Tuesday, January 21 and 22, 1901.

Promptly at 3 P. M., President Howard A. Chase called the members to order and declared the meeting ready for business. After the reading and approval of minutes of previous meeting, a recess of five minutes was ordered to enable members to pay dues and to give those desiring to join the association an opportunity to do so.

Upon resuming business, the chair appointed Wm. H. Moon, Edwin W. Thomas and Thomas Rakestraw, a committee to nominate officers for the ensuing year.

The annual report of the treasurer was submitted and referred to an auditing committee. The statement showed a balance of \$20.26 in treasurer's hands.

The following new members have been added to the Association during the year:

J. K. Bittenbender, Bloomsburg.
D. D. Breisch, Ringtown.
Robt. A. Breisch, Ringtown.
S. G. Bryfogle, Bloomsburg.
J. L. Dillon, Bloomsburg.
M. Garrahan, Kingston.
Miss Mary M. Haines, Cheltenham.
Philip Harris, Cabin Run.
James Krewson & Sons, Cheltenham.
Charles M. Leshner, Northumberland.

R. C. Mackall, Beaver.
William Myers, Bendersville.
G. S. McHenry, Benton.
Jno. R. Neyhard, Bloomsburg.
A. C. Richards, New Paris.
W. H. Rumbel, Ringtown.
P. P. Smith, Sunbury.
E. M. Stone, Stull.
Gilbert Troutman, Millersburg.
A. P. Young, Millville.

H. C. Snavely, chairman General Fruit Committee, submitted his report, which is as follows:

REPORT OF THE GENERAL FRUIT COMMITTEE TO THE STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

On the 20th of last December, I sent out one hundred and seven blanks, one or more to each county in the State. Replies were received from seventy-two correspondents and from all sections, though a few counties failed to report. Enough can be gleaned from these reports, however, to enable me to report a fairly accurate condition of the fruit industry and of the horticultural progress in the State.

APPLES.

The results in the apple orchards have, in most cases, been disappointing and unprofitable. The failure of this fruit can, in a large degree, be attributed to natural causes. In some portions of the State the bloom promised a good crop, but late frosts and frequent rains nipped the prospects in the early stages. In other instances the fruit dropped from no known causes. As the season advanced and dry weather set in, coupled with the appearance of the caterpillars, codling moths and other insect pests to which the apple is subject, the prospects for a good crop grew less and less. Practically all parts of the State were affected by the drouth and the high temperature for weeks caused the fruit to ripen prematurely and fall. In some cases the apples were baked on the trees. The conditions were favorable for the increase and activity of all insects, but fungi gave less trouble than usual. About twenty-five correspondents report a full crop, but fruit was of inferior quality and did not keep well. The rest report from medium setting to a failure.

The tornado, known as the Galveston storm, brought a very large part of the crop to the ground, which was made into cider or left on the ground to rot.

A number of correspondents assert that apple trees carefully sprayed produce more fruit, are of better quality and keep better. Varieties best adapted to localities and favorably mentioned are referred to in observations of correspondents.

PEARS.

Pear culture, on the whole, proved more successful than that of the apple. The early maturing fruit was of good quality, but later varieties were smaller and of inferior quality. Fine crops of Kieffer

are reported, which, in some localities, sold for remunerative prices, notwithstanding the large crop of peaches.

One correspondent says that the Kieffer at twenty cents a basket is the most profitable pear to grow.

It seems the Kieffer receives less abuse than formerly, and it is safe to predict that not all the Kieffer pear trees will be dug up for some years to come, at least not until a variety as productive and of higher quality takes its place. As a canning fruit it has come to stay. A comparatively small number of correspondents report a failure of pears.

I would especially call attention to a pear tree in Allegheny county referred to by Mr. Burns.

PEACHES.

The majority of correspondents report a large crop of peaches, but, except where through cultivation and thinning the fruit were practiced, the results were small fruit and largely of inferior quality. Much of the fruit ripened prematurely, caused by "yellows," want of cultivation, and last, but not least, for want of insufficient available plant food. A dry summer like 1900 tests the skill of the peach grower, and only those who attended to details were rewarded with satisfactory results. Some correspondents report that successful peach growing in the Juniata Valley is a thing of the past. Reports from the Penn Mar district are not much more encouraging. Yellows is assigned as the cause.

In some localities the buds were practically all destroyed as a result of the low temperature in winter and spring.

The Elberta, where hardiness of bud is not essential, is probably the most popular peach. The relative hardiness of the different varieties of peaches should be considered when planting an orchard.

Mr. Greenlee, of Mercer county, claims that the Mercer, a peach of high quality, is almost as hardy as the Early Rivers. The test was made in an orchard of thirty varieties. A severe freeze in March showed that the Reeves, Favorite Stump, Smock and Fox were much hardier in the bud than Crawford Late, Old Mixon, Mt. Rose, Elberta and some others.

PLUMS.

The three plagues of the plum grower are black knot, the curculio and rot. The first must be fought with the knife and the diseased part burned. If it appears on large limbs shave out carefully and cover the parts with turpentine. Jarring the trees is the only effective means to get rid of the curculio. The "Little Turk" wants

a good shaking "down" and then killed. He mocks you for spraying him. He needs more vigorous treatment. Rot can be held in check by the use of Bordeaux mixture and the ammoniacal solution. Japan varieties must be sprayed cautiously to avoid injury to the foliage. The Americans don't need much attention.

It seems if our finer varieties of the *Domestica* would be neglected and the field of plum culture be given to the varieties of Japanese origin. Where the climate does not militate, these latter can possibly be grown with more certainty. They are prodigious bearers, and after the "Little Turk" has lived in glory, and finished his job of making crescents, enough fruit remains to satisfy the ambition of the ordinary plum grower. There seems to be an entire neglect of the Wild Goose type of plums. With intelligent cross fertilization they can be grown at a profit. They are exempt from the knot and but little affected by the curculio and rot. They mature early and are out of the market before the larger and better varieties appear.

The Abundance seems to be the leading plum to-day in this State.

QUINCES.

This fruit is not grown to any extent, and where attempted, in most cases, is pronounced a failure. Worms, and rot, and blight seem to be the drawbacks. Only a few report satisfactory results.

CHERRIES.

This crop proved a success in most localities. The dry weather saved the crop from rotting. In some localities the low temperature nipped the buds. Sour cherries the most reliable. Some heart and bigareau are favorably mentioned.

GRAPES.

Except in the district along the shores of Lake Erie, known as the "Chautauqua Belt," but few satisfactory results are reported, except where fruit was bagged or sprayed. It is claimed that bagging impairs the quality of the grape. Spraying is more economical. In the early part of the season, Bordeaux mixture should be used, but later, to prevent discoloring, the ammoniacal solution should be substituted. Some of the observations by correspondents are of interest and they appear under that heading.

SMALL FRUITS.

The strawberry succeeded in most localities. The drouth and heat impaired the quality of the later varieties.

Raspberries and blackberries were inferior in size and quality owing to the dry and hot weather. Currants receive more attention and good yields are reported.

Of strawberries, the Glen Mary appears to embody many good points. New York is a very promising variety.

The Cumberland raspberry is a valuable acquisition.

The Eldorado blackberry is forging to the front.

VEGETABLES.

Most of the reports indicate a light crop of vegetables. The earlier varieties did fairly well, but all late summer vegetables suffered from the drought.

Where thorough cultivation was given, results were much more satisfactory.

The potato bug and the cabbage worm, as well as other pests that beset the gardener, seem to be satisfied with our form of government and its administration. They have adjusted themselves to their environments and are here to stay.

SHRUBBERY, PLANTS AND FLOWERS.

The reports indicate an advance in the planting of ornamental trees and shrubbery, as well as the cultivation and care of flowers. It is to be regretted that in some few localities there is no progress. By and by, when we can have Nature Study in the schools, the country home will have pleasanter surroundings. The boys and the girls will be quick to catch on to the beautiful and the good in nature and make it contribute to the enjoyment of life. I want to express the wish that this body will go on record as favorable to the introduction of Nature Study in our schools.

SPRAYING.

While it is almost universally admitted that spraying, to combat insects and to control fungi, has been beneficial and profitable, and is practiced in almost every locality, where results have become an object lesson, yet the vast majority of farmers neglect to do it. This neglect results often in failures and oftener in crops of inferior quality. It is beyond question that if the work is done properly and in season that the outlay is a good investment.

The negligent farmer breeds trouble for his more thrifty neighbor. Unlike cattle, insects are not confined by fences. The breeder of San José Scale without attempting its eradication, menaces his neighbor.

FEEDING AND CULTIVATION.

After having made careful selection of trees and varieties, judicious feeding and thorough cultivation enter into the problem of loss or gain. The dairy farmer and the poultry man feed a ration for a purpose.

Tree planters too often have no further concern than to plant the tree. No thought is given to feeding and cultivation, and often a scrub instead of a thrifty, promising tree is the result. In its early life the tree needs to be fed for wood growth, but when it attains bearing age then the diet must be changed, and the food ration varies in different kinds of fruit. But whether it is wood or fruit that is wanted the cultivation must be thorough and constant. No live farmer would expect a large crop of corn without thorough cultivation and liberal manuring, nor can one expect good results in the orchard without feeding and cultivation. These are inseparable necessities.

GENERAL OBSERVATIONS.

L. C. Longsdorf, of Adams county, reports that spraying proves beneficial but is not practiced enough. Season too dry for best results. Of plums, the Japan varieties and the Sharpshire Damson succeed best. Except the Kieffer the pear crop was light. Apples fair to good where properly sprayed.

J. S. Burns, of Allegheny county, says that severe frosts on the nights of May 3d, 4th and 9th destroyed nearly all their fruits. Of a Damson plum tree, he says, the blossoms were frozen stiff and yet it produced a heavy crop of fruit. He reports potatoes grown under straw doing the best. He was very successful in growing turnips in corn by growing crimson clover and turnips together. He says from April 23 until November 25 the soil was never wet to the depth of a potato tuber and yet had good yields in many cases, which he attributes to continuous cultivation.

Mr. Burns makes mention of a pear tree that is ninety-five years old, known as the Sugar pear. It is a constant bearer and some of the fruit weighs one pound and is of good quality. The tree is fifty feet high and two and one-half feet from the ground its circumference is nine feet six inches.

A. L. McKibben, of Beaver county, says the season in our part of the State appeared to be against all kinds of fruit. The extremely hot weather had affected it and nearly all fell before season arrived for storing it away. More attention given to shrubberies and flowers each year.

Cyrus T. Fox, of Berks county, says the season as a whole was favorable for the fruit grower and gardener. The drought of the fall and a violent storm brought much of the fruit to the ground just before picking time. Late vegetables a failure. Reports a new seedling peach, known as the "Reading Seedling." It is late and extra large size.

Oliver D. Schock, reporting for the northern portion of Berks county, says yield of leading fruits was an average. He says "the grand Smokehouse apple have become a favorite in northern Berks and produces large crops annually. Baldwin and Northern Spy are more generally planted." He says success with peaches is altogether a matter of care and attention. Nut culture is on the increase. He urges that with hyacinths, tulips, narcissus, lilies and other flowering bulbs grown so cheaply in Holland and some of our Southern States, every one with a few feet of ground should plant some.

R. M. Welles, of Bradford county, reports a fair crop of fruit except berries—most new varieties disappointing. Too dry for vegetables. He says that the tender varieties of grapes, like Brighton, Niagara, Empire and Brilliant were a very light yield. Campbell's Early bears well but is very loose on the bunches and very liable to red rust, mildew, and does not ripen well. In his opinion not equal to the Worden. Reporting on spraying, he says it is more effective in keeping off fungi than the codling moth.

William H. Moon, of Bucks county, says that apples that were sprayed kept better and were of better quality. Scale has appeared in his county. A committee secured proper apparatus to combat the pest.

Jno. J. Thomas, of Cambria county, says that the Clyde, Haverland and Bubach strawberries were the leaders. He asserts that as a result of spraying honey bees are killed.

M. L. Makin, of Cambria county, says apples were a good crop, but not keeping well. Progress in ornamental planting; spraying beneficial.

Prof. Geo. C. Butz, of Centre county, reports apples half a crop, not keeping well; scarcely any pears. More fruit growers are spraying now than ever before, and with satisfactory results.

Samuel Hall, of Clearfield county, says apples, pears, grapes and small fruits a good yield. Ornamental planting receives a good deal of attention. No attention paid to spraying.

G. T. Henry, of Clarion county, reports the fruit crop in his section almost a failure. No spraying done. Season for vegetables was favorable.

J. A. Herr, of Clinton county, reports an average crop of apples and pears. Apples keeping fairly well. An extra crop of peaches of fine quality. Grapes, a light crop. Spraying not practiced to any great extent. The season was the dryest ever known in his section of the State.

W. T. Creasy, of Columbia county, reports peach yellows on the increase. Black knot increasing. Tent caterpillars in enormous quantities. A large yield of apples, but drought ruined the crop. Not much spraying.

Jacob L. Rife, of Cumberland county, reports a moderate crop of apples. Grimes' Golden, York Imperial and Ben Davis the most profitable. Pears the best crop in five years. Peaches, an immense crop. Quality good, but small on account of overloaded trees, except on young trees. Of cherries, Black Tartarian, Triumph of Cumberland, Ida and Napoleon are preferred. Grapes, Morris' Early and Concord fair crop and good quality. Diamond, Niagara and some other varieties, foliage scorched by the sun and did not ripen. Strawberries, Bubach, Glen Mary and Brandywine the best. Vegetables, short crop. Some spraying with varying results.

Thomas Rakestraw, of Chester county, reports a light and inferior crop of apples. Pears grown but little, except Kieffer, which were large and fine. The orchards at Atglen produced 35 carloads of 800 baskets each. Peaches a heavy crop. No peach stands higher in general estimation than Elberta. Picked 110 baskets from 22 trees, three years old, and two old trees yielded 25 baskets. Plums grown are principally the Japan varieties. Abundance the leader, with Red Jones, Chabot and Wickson promising well. Tendency to rot the great drawback to plum culture. Of cherries, the Montmorency the most popular. Good crop of gooseberries and currants. Downing preferred to all others. Of ten kinds of currants, North Star proved the best for growth of bush and heavy yield. Culture under glass on the increase. Mushroom culture receives more attention, and thousand of tons of manure used in raising them. Comparatively few practice spraying, though when properly done results prove beneficial.

Gabriel Hiester, of Dauphin county, says that apples and pears set a full crop, but due to drought ripened too early and pears remained small. Peaches, trees overloaded, fruit small. Grape crop, light on unsprayed vines; mildew and rot bad. Sprayed vines produced fine fruit. Thinks the codling moth worse than usual. In spite of careful spraying had more wormy fruit than for a number of years. Believes in late spraying to protect the foliage of the apple and pear from leaf blight, and for this purpose prefers the ammoniacal solution of carbonate of copper.

E. C. Brinser, of Dauphin county, had best success with Ben Davis, York Imperial, Pound and Dominion apples. Peaches, an immense crop; early varieties under size, but by continuous thinning late fruit was No. 1 and obtained fair prices. Is inclined to think the practice of spraying is growing less because if not done thoroughly results proved unsatisfactory.

Jos. W. Paschall, of Delaware county, reports a light yield of apples, due to the drouth. Japan plums set full crops but not on the trees. A disposition to plant more shrubbery and flowers. Cultivated chestnuts, a good crop, but natural fruit a failure.

Frank Simpson, of Elk county, reports a fair yield of apples of good quality, and keeping well. Strawberries, excellent yield. Glen Mary very good. Other fruits not reported or a failure.

L. G. Young, of Erie county, reports a large portion of the apple crop harvested by the Galveston gale and balance not keeping well. Pears, a good yield. Outside the Elberta, the Crawfords and those of the Melocaton type, the crop was good and prices fair. Off year for plums. Fair crop of German prunes, Lombards and Moore's Artics. Large crop of quinces. Cherries, a light crop, but good yield of Montmorency and English Morells. Grapes, the largest

crop ever raised: Shipments from North East, 1,000 cars; from Chautauqua belt 7,500 cars; yield, 1,200 eight-pound baskets per acre. Principal varieties are Moore's Early, Concord and Worden, black; Niagara and Pocklington, white, and Delaware and Catawba, red. No rot, but some vineyards have rose bug. Spraying is practiced by the leading fruit growers. Had very good success spraying peaches for "leaf curl." Spray before buds open; sometimes, for rot, later in season. Bordeaux is used in both cases.

S. M. Wakefield, of Fayette county, reports a poor crop or failure, except cherries, grapes and berries. Spraying is neglected. In his opinion all will have to spray if fruit is to be expected. Believes spraying should be made compulsory.

C. A. Randall, of Forest county, reports average yield of apples of fair quality and keeping well. Small fruits, a good crop; other fruits light or a failure. Ornamental planting on the increase. Borers and caterpillars more destructive than usual.

C. W. Good, of Franklin county, reports apples one-fourth crop. Regards the Baldwin with more favor. Pears a good yield. As to number of peaches, he says, the crop was about half, but in quality and size of fruit it was a perplexity. There were, however, some fair peaches. Cherries, an excellent crop.

Geo. M. Branthraver, of Franklin county, says peaches were largely inferior on account of drouth, but orchards properly cultivated not affected as seriously. House yard adornment is on the increase. Spraying neglected. Fewer insects than usual.

L. W. Gwynne, of Greene county, reports a small yield of apples. Large crop of fine peaches. Average crop of plums; all varieties do well. Not much spraying, but where practical, results very satisfactory.

Geo. W. Owens, of Huntingdon county, says that spring prospect for apples and pears was good, but storms and drouth destroyed most of the crop. Fair crop of peaches of fair quality. Curculio very destructive on the plum. Sour cherries most satisfactory. Rot and mildew injured grapes. Of berries, the older varieties most satisfactory. Spraying a success where tried.

J. T. Ailman, of Juniata county, reports apples a full average crop of inferior quality. Good many peaches, quality poor. Grape growing abandoned on account of rot. Spraying practiced to a limited extent; results good.

Henry W. Northup, of Lackawanna county, reports an excellent yield of apples, a little under size, on account of drouth. Fine crop of pears. Large crop of plums; Abundance and Burbank best. Too dry for vegetables. Most of best farmers have spraying outfit.

J. H. Hathrill, of Lackawanna county, reports good crops of apples and pears of good quality. Abundance, Burbank and Red

June best plums. Of newer grapes, Campbell's Early, Green's Early and Moore's Diamond proved good. Progress in shrubbery and flowers very good. Benefits of spraying very marked.

Daniel D. Herr, of Lancaster county, reports a large crop of apples, but dropped before picking time. Speaks well of the Stark, Gano and Missouri Pippin. Peach trees overloaded, where not thinned. Fine crop of plums, especially the Japans. Of cherries, Schmidt and Windsor have come to stay. Clyde and Bubach lead in Strawberries. Cumberland and Eureka best raspberries. Best blackberry, Eldorado.

Calvin Cooper, of Lancaster county, says apple trees set a fair average crop, but the excessive heat and drouth scorched much of the foliage and the fruit dropped. Apples remaining, as well as pears, of inferior quality. Thrifty trees on elevated ground, fine crop of peaches. Fair crop of plums, but Japans are affected by altitude. Spraying profitable where properly attended to.

W. P. Brinton, of Lancaster county, says there is a great increase in the demand for shrubbery flowers. "Spraying is going back. It seems questionable whether it produces the good results claimed for it."

Samuel McCreary, of Lawrence county, reports a very large crop of pears and no peaches. Small fruits did well. Vegetables above average crop. Improvement in ornamental planting.

W. B. K. Johnson, of Lehigh county, says that sprayed trees produced apples of fair quality and comparatively free from scab. Pears, a heavy crop. Reports of a party that planted 1,100 peach trees in 1897, and last season the crop yielded enough to pay for land, trees and all other expenses, with a small balance left. Quince crop best for years. Grapes, in bags, did well, but bagging impairs quality. Plums rotted badly, but where sprayed with the Bordeaux mixture in season the rot was under control. Leaf curl, on peaches, can be controlled by spraying with Bordeaux. In his opinion the day has gone by when good fruit can be grown without spraying.

P. Sutton, of Luzerne county, says apples were above an average crop, but generally of poor quality. A large crop of peaches and fine fruit, where thinned. Of cherries, Early Richmond, May Duke and Black Tartarian were mostly grown. Cumberland raspberry promises to be the leading variety. Large crop of early vegetables. Spraying pays. He says the New York strawberry is a rampant grower, large plants and very large berries of fine shape. Glen Mary has come to stay; bears large berries to the end of the season.

A. B. Greenlee, of Mercer county, reports the apples of greatest merit in his orchard as York Imperial and Winter Blush, the latter

a long-keeping variety. These also stood the storm, when others were blown off. The winter freeze was very damaging to peaches, plums, cherries and grapes. Of thirty varieties of peaches, he finds only the Early Rivers hardier in bud than the Mercer, a seedling originated in Mercer county. With him the Crosby is not any hardier than the Crawfords, Damson, Smith's Orleans, Red June and Miner and made a fair crop of fruit. Mr. Greenlee recommends Franklin, Venango county, for next place of meeting.

John T. Crill, of Mercer county, reports poor crop of plums, cherries, quinces, peaches and berries. Good yield of apples; keeping poorly. Good results from spraying.

Henry Ort, of Millin county, says the storms and drouth prevented all fruit except the peach and grape. Mr. Ort is 80 years of age and "unable to keep up with the times, but nothing does me more good than to hear of good fruit culture."

John P. Fredd, of Montgomery county, reports a poor crop of apples. Large crop of peaches, but under size, due to drouth. Japan plums do best. Too dry for vegetables. Reports the spread of the San José Scale. Lost several hundred trees.

D. C. Young, of McKean county, says his section is well adapted for growing fine apples and pears, but altitude too great for peaches, cherries, grapes, etc.

J. K. Murray, of Montour county, says the caterpillars in his locality proved very destructive; whole orchards were stripped and trees are apparently beyond recovery. He sprayed trees with soft soap suds while nests of insects were small. Believes that an application of Paris green only checks fungi.

B. B. McClure, of Northampton county, reports good crops of apples, pears, peaches and plums. Of plums, Burbank, Abundance and Satsuma do best. Very light crop of cherries. Too dry for vegetables. Unsprayed trees have more imperfect fruit.

W. M. Benninger, of Northampton county, reports the fruit crop destroyed by wind and hail in his locality. Believes spraying is beneficial when the fruit sets lightly, but of no advantage when it sets heavily.

Mendelson Meehan, of Philadelphia, reports the crop of apples large, but poor, if not sprayed. Plums, Japan are favorites. Bagged or sprayed grapes were excellent. Berries, unusually large crop. Progress in ornamental planting naturally far exceeds that of fruits. Practice of spraying extends moderately and successfully.

E. D. Austin, of Potter county, says the conditions were very unfavorable. Early season, cool weather and much rain. Drouth set in in July and continued for nearly four months. Apples were baked on the trees. While vegetation suffered, every crawling, flying and creeping thing multiplied and flourished.

W. A. Gardner, of Potter county, says that the storm and drouth destroyed most of the apple crop. Sour cherries do well, but black knot ruins the trees.

W. H. Stout, of Schuylkill county, reports an average crop of apples, mostly cider stock. Large crop of pears. Peaches, a failure, owing to freeze in March. Common cherries the main reliance. Early vegetables succeeded. Late plantings and late varieties a failure. Does not doubt the benefits from spraying. Insects unusually numerous.

A. F. Kimmel, of Schuylkill, says peaches were about half a crop, of good quality. In plums, Abundance and Burbank do best. Full crop of quinces, good quality; says Eaton is a fine grape.

Jno. F. Boyer, of Snyder county, reports a short crop of fruit, with the exception of peaches. Where given proper cultivation and the fruit thinned the quality was good. Apples might have turned out a fair crop, but spraying was neglected.

O. P. Shaver, of Somerset county, reports good fruit crops except peaches and cherries, which were frozen in bud. Of peaches, the Alexander, Early Rivers and Champion withstood the low temperature best. Champion, very fine. Sold his crop in orchard at \$1.80 per bushel. Grape vines were loaded to the utmost. Good yield of vegetables. Effects of spraying apparent.

Jno. W. Rodgers, of Sullivan county, reports good crops of pears and grapes. Strawberries, a good crop. Other small fruits a failure. No peaches and half a crop of apples. Good progress in shrubbery and results of spraying good.

R. S. Searle, of Susquehanna county, says the apple crop was very large, but does not keep well. Too dry for vegetables. More interest manifested in ornamental gardening. Spraying neglected. More feeding, more trimming and more spraying required to insure success.

S. M. Baker, of Tioga county, says apples, pears and cherries did poorly. Peaches a good crop. Drouth cut all crops short, except insects.

J. Newton Glover, of Union county, says the yield of apples promised well, but high winds and drouth brought down much of the fruit. Rest keeping well. A good crop of peaches where not frozen in bud in March. Japan plums do well. Spraying gives satisfactory results. Suspects that the San José Scale is at work in some of the orchards. Tent caterpillars unusually plenty.

R. J. Weld, of Warren county, reports a light crop of apples and pears; too dry. No peaches. Plums, cherries and grapes, average crops. Home adornment on the increase. Spraying is neglected.

Willis Cowan, of Warren county, says apples, pears, plums and

quinces a small crop. Peaches, a total failure. Grapes and cherries, a good yield. Season favorable for vegetables.

Pressley Lerch, of Washington county, says all fruit crops were poor, except cherries, grapes and small fruits. Of plums, the Abundance succeeds best. Of cherries, Gov. Wood and Black Tartarian. He complains of the damages done by the ground hogs in the orchards. Thinks a bounty ought to be offered for their destruction.

John Neill, of Washington county, reports success with grapes, berries and vegetables. The fruits a failure, or very light. From ninety feet square he raised and sold 1,500 quarts of strawberries at seven cents a quart in the bed. (This is at the rate of 8,000 quarts to the acre.) His neighbors told him he was doing some very nice gardening, but would not be paid for his work. All the same he was. Succeeds well in raising timber, but fruit failures are the rule. Had only one good crop of peaches in seven years. Knows of one man who succeeded with Japanese plums.

Theodore Day, of Wayne county, reports a large crop of apples, of good quality, but not keeping well. Too warm and dry. He has fruited some of the varieties he received of grafts from the United States Department of Agriculture. "McMahon and Celeste prove to be very good fall or early winter apples, medium or a little above in size. Color, white, with slight red blush; fine flavor, mild, sour. Bryant apple is evidently a good bearer, medium size, much like Twenty-Ounce Pippin, often called Grovenstein, but only half its size, getting ripe and eatable now—December. Other varieties are small, some kinds little larger than crab apples, and very hard yet. Possibly there may be one or two good long keepers among them. Mr. Day makes mention of inoculating disease among the tent caterpillars and claims to be successful. Borers and wooly aphis kill many trees.

W. R. Barnhart, of Westmoreland county, says fruit crops in his locality were largely a failure, due to late spring frosts, except grapes and berries. Vegetables good. Very good progress in ornamental gardening.

A. Ruth, of Westmoreland county, says late spring frost destroyed fruit to great extent. Kieffer and Catherine pears did well. Only a few peach buds escaped the late frost. In plums only the Damsons succeeded. Grapes and berries, fair crops. Vegetables, fair.

Col. J. A. Stahle, of York county, reports a light yield of apples and pears. Peaches, an immense crop of fair quality. Abundance way ahead in plums. Black Eagle the best cherry. Grapes, fine. Strawberries less than full crop; raspberries, injured by drouth. Spraying a success, but is neglected. Not so dry and hot in thirty-four years.

Prof. S. B. Heiges, of York county, says the Goldstein grape has

proven the earliest in cultivation; bunches of fairly good size, a light purplish red and of fairly good quality. San José Scale makes its appearance and unless vigorous measures be adopted many trees must succumb. Owing to extreme drouth all the various crops of fruits were below the average in productiveness, size, quality and condition to keep well. An increased interest is manifested in ornamental gardening. Japanese plums did best. Best varieties of cherries, Early Richmond, Hoke, Mercer and Black Tartarian.

L. W. Lighty, of Adams county, says the peach crop would have been extra large, but the extreme drouth cut it in half and that half rather poor. Plums frozen in bud. Late berries dried up. Fruit growers are slowly learning to value of spraying.

J. E. Haudenschild, of Allegheny county, reports light crop of apples, average yield of pears, but of inferior quality and size. Peaches almost a complete failure. Damson succeeds in plums. Grapes and small fruits, average crops. A growing interest in ornamental planting. By spraying, grape rot almost eradicated and held in check.

J. Donaldson, of Armstrong county, reports short crops or failures of all kinds of fruits except berries. Good progress in home adornment. Spraying must be done or no good fruit. Successfully cultivated plums are German Prune, Lombard, Abundance, Shipper's Pride, and Damsons. Best cherries, Luelling, May Duke, Early Richmond, Napoleon, Bigareau and Louis Phillippe.

Howard G. McGowan, of Berks county, reports small yield of pears, and apples not large. Peaches, fair. Plums rotted badly; Abundance and Red June, best. Cherries, good yield; Yellow Spanish liable to rot. Grapes, a good crop. Only one farmer in fifty sprays, but the results are so convincing that more will practice it.

Frederick Jaekel, of Blair county, reports fair to fine crops of fruit, except apples, which were only one-fourth crop. Best plums for his section of the State, German Prune, Damson, Yellow Gage, Transparent, Lombard, Czar and some of the Japanese. Best varieties of cherries, Napoleon Bigareau, Black Tartarian, Early Richmond, Montmorency and Ostheim. Spraying beneficial for fungi and insects. More interest manifested in flowering plants and shrubbery.

H. W. Comfort, of Bucks county, reports a half crop of apples. Peaches a poor crop. Richland and Japan plums do best.

J. N. Pyle, of Chester county, reports insect depredations worse than he ever knew, but few apples left on trees at picking time. Kieffer the most profitable pear. Peach trees overloaded and where not thinned remained small and inferior. Japan plum trees retain a good setting after the drop caused by the curculio. Fine crop of grapes, were sprayed. Best results with Nieh Ohmer, Wm. Belt, Marshall and Gladstone, of newer varieties of strawberries.

Jos. W. Thomas, of Chester county, reports apple crop a failure. Peach trees too heavily loaded, fruit small and price low. Considers Bradshaw one of the best varieties of plums. Quinces succeed best when planted near running water. A marked increase in ornamental planting. Marked benefits result from spraying.

J. E. Jamson, of Juniata county, reports a good yield of pears and peaches, but other kinds a short crop. Apple trees that bloomed fine and promised well produced but little fruit. Peaches were small, due to drouth; a great deal of yellows and believes that profitable peach culture is a thing of the past. Increase in the planting of shrubbery and ornamental trees. Wants to put in a good word for the Smith's Cider apple and the Kieffer pear; the latter grows in favor as it becomes better known.

DISCUSSION.

The Secretary.—I notice one correspondent reports that the Kieffer pear at 20 cents a basket is the most profitable variety to grow. Is it not impossible at times to sell them at any price?

Mr. Bartram.—At this time my crop of 1900 is still unsold.

Mr. Hiester.—I have no Kieffer orchard, only a few trees, but have been able to dispose of my crop at seventy-five cents per basket.

The Chair.—I believe it is a fact that most Kieffers are sold at a loss or not at all.

Mr. Jamison.—I disposed of all my surplus at forty-five to fifty cents per basket, and could have sold more.

Mr. Pyle.—I consider the growing of Kieffer pears at twenty-five cents a basket a good business.

The Chair.—In connection with the discussion of Report of General Fruit Committee, I would suggest that Topic No. 35 be considered:

“What Part Does Cultivation Play in the Systematic Feeding of Trees and Plants?”

Mr. Snively.—I would say the same part that cultivation plays in growing a crop of corn. Proper cultivation, proper feeding and spraying are three essentials in successful fruit culture. In orchard culture, I usually cultivate both ways with disc harrow, so as to destroy all weeds. For getting close to the trees I use the Morgan grape hoe. One of the most important results of cultivation is the covering of moisture, which is so essential to the proper development and maturing of summer and autumn fruits. I am satisfied that frequent cultivation of my peach orchard made for me at No. 1 crop of peaches. I do not use stable manure in any of my orchards, believing it breeds fungi and insects. I occasionally plow down a crop of clover.

The Chair.—Doctors will disagree. Mr. Meehan used to advocate

non-culture, and advised keeping orchards in grass and top-dressing annually. Many now train their trees low, making it almost impossible to cultivate. The best apples I grow are on trees where lower limbs rest on the ground.

Sam'l C. Moon.—Where trees are so low there is no occasion to cultivate, as no grass will grow. There is an orchard in my neighborhood that has not been plowed in forty or fifty years. It has been the practice of the owner to apply a cart-load of manure to each tree every three or four years. The orchard is one of the best in the vicinity.

Mr. Snively.—I apply all fertilizers in the fall, six months from fruiting season. The object is to have the late autumn rains wash the plant food down, so as to keep the roots far as possible below the surface and out of the reach of the plow and cultivator.

Mr. Longsdorf.—I am not opposed to cultivation, but in seasons of extreme drouth, like last, I am not sure it is best. Think mulching just as good.

Wm. H. Moon.—I have always heard that Pennsylvania is a State of great possibilities. The report of the General Fruit Committee has proven that assertion. It has also proven that doctors disagree. Some report Kieffer pears on the wane; others say it is desirable and deserves extensive planting. Some report large crops of grapes, others the contrary, but all agree that the Kieffer pear tree will bear large crop of fruit. While I have heard many valuable and interesting reports, this one has more points of interest than any we have had for some time, and I congratulate the chairman on his excellent paper.

Mr. Peters.—Four years ago, on my father's farm, we planted over 100 York Imperial trees. After they were planted a year we conceived the idea of drawing the roots from the surface. We dug a circle about forty inches in diameter around each tree, about twenty-three inches in depth. Into this, barnyard and hog manure were placed, and the trees have made a good growth. Last year we planted about seven acres more with one-year-old trees. There was a hard-pan subsoil and holes were blown out with dynamite. The holes were made very deep, manure put in bottom and tramped, then more manure and earth, then we planted the trees. We hope thus to draw down the roots, so that we can cultivate without destroying them.

CHESTNUT CULTURE.

Topic No. 33. "What is the Outlook for Profit in Chestnut Culture?" was next considered.

Mr. Barfram asked how to prevent the ravages of the chestnut

worm, or weevil. He stated that his crop last season was scarcely worth gathering.

The following letter bearing on the subject was read by the secretary:

Edenville, Pa., January 15, 1901.

Mr. Enos B. Engle, Secretary State Horticultural Association, Waynesboro, Pa.:

Dear Sir: I am in receipt of your favor and in reply will say that I will not be able to attend the meeting at Harrisburg on account of one of my clerks being away on a leave of absence.

You ask me for my views in reference to "the outlook for profit in chestnut culture." My experience in chestnut culture is very limited. I have an orchard of about 4,000 trees, a small proportion of which had been bearing for the past three years. The first year I did not find many weevil, the second year more and this season still more, although I was trying to counteract their work as best I knew. The second year ten per cent. were stung by the weevil, and this season not less than fifteen per cent., and if I had not made an effort to prevent them from doing their work the percentage would have been much higher this season. I find the same conditions on the mountain with the native chestnuts, only much more so. I have given the weevil problem a great deal of thought and attention for the past year, and to sum up with the knowledge I now have, I believe that "the outlook for profit in chestnut culture" is very poor indeed, and unless some way is found to counteract the ravages of weevil it will be an entire failure.

I have, for the past two years, been experimenting in various ways to prevent them from getting their work in and I shall continue to fight it out on that line, but whether the weevil will come out the victor in the end I cannot say. Hoping that some one will report more favorably so as to give more encouragement to the grower, I remain

Yours respectfully,

L. L. SPRINGER.

The Secretary.—In confirmation of the views advanced by my correspondent, I will give briefly the result of my observations in the chestnut grove grafted by my father some twelve or fifteen years since, the pioneer chestnut orchard in the country, if I am not mistaken. I might state also just here that a forest fire swept over almost the entire grove in July last, and the probabilities are that it will be almost a total loss, although the extent of the damage cannot be definitely fixed until the coming year.

The grove was started by grafting Paragon on the one-year-old sprouts of common American chestnut, that had grown up after the original trees had been cleared away. The grafting was a success, as nearly all the scions grew and made fine, stocky trees which began bearing the second year after grafting. Where they stood too close they were thinned out from time to time, preference being given to the most vigorous trees. The grove contains about thirty acres and bore annually, increasing in quantity, until 1899.

when the entire yield was some 250 bushels, about one-fourth of which were worthless on account of the weevil. Last year (1900) the fire destroyed it and only about ten bushels were gathered, fully fifty per cent. of which were wormy. The land upon which the grove is located is on a hillside, rough, rocky and useless for farming or any purpose except timber, and notwithstanding it is comparatively barren and in spots well nigh inaccessible, the trees were making a fine growth until destroyed. It is surrounded on three sides by forest, mostly of chestnut timber, and to this I attribute the great destruction of nuts by the weevil. While at first the loss was small, only five to ten per cent., it has increased annually, and the outlook for profitable crops in the future is not encouraging. On trees which are isolated and growing about the buildings on my father's farm the nuts are finer and there is a small percentage of loss. In my opinion the only successful method of growing chestnuts is to plant them in orchards away from the wild forests, give them cultivation and attention, and as far as possible destroy all wormy nuts as they fall to the ground. Grown in this way they will bear almost annual crops and yield a fair profit.

Wm. H. Moon.—The greatest difficulty seem to be in transplanting. Unless frequently transplanted in the nursery it is difficult to get a fair proportion to grow.

Mr. Bartram.—I would cut the top roots when two years old. Have lost but few when treated in this way.

Samuel C. Moon.—I do not believe any money has been made in growing and grafting chestnut trees in the nursery. They are seasons when 75 per cent. of grafts will grow; other seasons not over 25 per cent. Then, in selling trees, those that die out are expected to be replaced.

Mr. Garretson.—I have had some experience with chestnuts, but only partial success. Have found the Japan varieties more easily grown than others, but not so good as Paragon.

Samuel C. Moon.—Out of some fifty seedlings raised by my father, only three were considered worthy of dissemination. Most of them bore small nuts. One of the most valuable had a peculiar habit of dropping its burrs before they opened.

Mr. Snively.—If in order, I suggest that the matter of spraying be discussed.

The Chair.—We will have a talk on that subject to-morrow by Mr. Cooper, and the discussion had better be postponed until then.

Mr. Wertz.—It seems to me a more important question is how to get rid of the scale. It is one of our most destructive enemies, and if not checked will some day drive us out of business. It is evident that additional legislation is necessary, and I hope some

action will be taken by this Society to have our Legislature pass a more stringent law.

The Chair.—Two years ago an act was passed to provide for the inspection and destruction of infested trees.

Mr. Wertz.—By that bill, as I understand it, is vested in the supervisors and auditors of townships, and that is the weakest part of the bill. I would prefer a law similar to that in operation in the State of Maryland. We might then expect something to be done toward eradicating the scale.

Mr. Longsdorf.—This is a matter of sufficient importance to demand our attention. Some of our supervisors do not know San José Scale from a potato bug, and the authority to act should be placed elsewhere.

Mr. Martin, Deputy Secretary of Agriculture.—There have been thousands of trees destroyed in the Juniata Valley. We find the difficulty not so much with orchardists as to find means to execute the law. I have no doubt the bill could be made more effective.

Ex-Secretary Edge.—The difficulty is, there is no money appropriated to execute the law.

Mr. Martin.—I know our Zoologist has visited some of these orchards, although the law does not designate his duty in the matter. This organization should endeavor to have the law amended by the present Legislature, so as to require orchards to be inspected and remedies applied.

Mr. Wertz.—I still contend that the present law does not reach the case and is practically inoperative. I may have a careless neighbor, or his infested hedge may join my property, and all I may do on my own grounds will be of no avail. Auditors and supervisors are not the men to do this work. It should be the duty of some representative of the State or Department of Agriculture. At present I would not buy trees from any Pennsylvania nurseryman, because our law is not sufficiently stringent.

On motion, adjourned.

Monday, January 21, 7.30 P. M.

The evening was devoted to addresses by Dr. Geo. G. Groff, Lewisburg, Pa., and Secretary Hamilton, of the Department of Agriculture. The former spoke of "The Fruits and Vegetables of Porto Rico," a topic which he made specially interesting and instructive by reason of a two-years' residence on that island, as Superintendent of Public Instruction. His remarks were not reported stenographically and a brief synopsis thereof only can be given.

He stated that Porto Rico is nearly 1,500 miles south of New York city, and steamers now make the trip in five days, but hope soon to reduce the time to four days. It is almost due south from New York, and is the most eastern of the Great Antilles. As regards the topography, the interior is very mountainous, the highest point being about 3,500 feet above sea level; the average height of the interior is about 2,000 feet. It really has no swamp land, although the lowlands are barely drained. The interior is cut up by numerous streams, of which there are said to be 1,300 on the island. The soil is fertile, and between the rocks it resembles the prairie soil of Dakota and other Western States. The rocks are of volcanic origin, covered with coral limestone and are rich in plant food.

Porto Rico is a land of perpetual summer, much like June and July in Pennsylvania. During three months of the year the climate is more like our August and September. Seventy-eight degrees is about the average temperature, and never higher than 96 degrees in August. The air is always tempered by stiff trade winds, almost too stiff for comfort. Sunstroke is said to be unknown. Forty degrees is the extreme variation of temperature.

As to the vegetables of Porto Rico, they have nearly all that we find in our Pennsylvania markets, but, as a rule, I think they are very little used. I was surprised to find that the wealthy people there live almost exclusively on a meat diet. Vegetables are hard to buy, and in two years I never saw but one real garden, and in this I saw asparagus. The bean seems at home on the island, though the rainy season is against it. The variety chiefly grown has a red skin. It cooks easily and is said to be much more digestible than the white varieties. There are a number of red varieties, some large, some small. Of Lima beans, I never saw any that were very good. They have a curious bean there which grows on trees, some bearing a bushel to the tree. Poor people use it as a substitute for coffee. Beets are seldom seen, and carrots I did not see at all. They grow cabbage, but not the hard, solid heads we have here. Cabbage is frequently brought from the States, and I am told it has sold as high as \$1.00 per head. Celery grows there, but never makes the thick, crisp stems it does here. Cucumbers grow anywhere on the island. Cantaloupes are good, but not raised to a great extent.

Sugar cane grows readily, and much of it is chewed by the natives for its juice. Men who work on the plantations almost live on the cane.

The cassava is a tuber something like a potato. I think it is a good vegetable, and it is frequently used. *Caladium esculentum* is also used extensively as food. It is usually boiled, but is a rather an inferior vegetable. Ginger grows wild. People use no condiment

except garlic, the use of which is almost universal. Egg plant is grown and much used, usually being taken when quite young and small. One variety grows on a tree, but it is poisonous and not used. Garlic is not grown on the island at all, and I never saw horse-radish there. Water and musk melons are seen occasionally. It is said they do not grow well in the tropics. Onions are used extensively, but are imported from Spain. They will come from there in perfect condition, while those from the States would spoil. Spanish onions are put up in ropes and seldom decay. Parsnips I did not see on the island. Peas are left to ripen on the stalks. They do not seem to know how to use them green. The green pepper grows there, but the red varieties are seldom seen and not put in food. The Irish potato is much used, but not extensively grown. The sweet potato grows almost wild. There are at least two kinds of red and two of yellow. They are larger than New Jersey sweets, but watery and not so good. Some grow to an enormous size, ten or twelve pounds. Pumpkins grow wild and are much used. Radishes can often be had in the markets, but, like lettuce, they are inclined to be bitter and rough. Rhubarb I did not see.

Rice is on the table there at almost every meal, and is mostly imported. Nearly all the native farmers have their little field of upland rice. It is boiled alone and annetto added to make it look richer, but it does not seem as nutritious as the imported. Of squashes, I did not see either Hubbard or Bush Scallop, but what appeared seemed to be a cross between the squash and calabash. I saw no spinach on the island.

Tomatoes are small, like marbles. An American on the south side of the island experimented with tomatoes, and grew some as fine as I ever saw. I think turnips can be grown the year round, but are little used. Yams, or roots, of various kinds are largely used. There are many plants of the lily family that produce bulbs that are used as food. They seem to be mostly woody matter, with not much nutrition. While a number of our vegetables are not grown in Porto Rico, every vegetable we have here at home can be seen in the markets there. On the north side of the island a number of gentlemen planted seeds, but without much success. Many failed to germinate and those that did germinate did not grow well, of which no explanation is offered.

As to fruits, all those coming from the tropics can be seen in Porto Rico. The mountains are full of orange, lemon and lime trees, but there is no attention paid to them whatever. There are sweet and sour oranges; the sweet are eaten, the sour used for cooking. Some contend that the oranges are not good, but in my opinion they are, on the average, as good as we have them here. I do not know of a grafted tree on the island. I never saw a grove of more than an

acre, though there is said to be one of eighteen acres. I don't think any are shipped from the island at present. They can be bought there very cheap, as low as six cents per hundred. I can see no reason why orange growing would not pay.

There are three kinds of lemons. They have a sweet lemon, that is flat at the ends, shaped somewhat like an apple. It is intensely sweet and is used only to a limited extent for preserving. One variety is very large, as large as a child's head, with a skin sometimes one-half an inch thick. No practical use is made of it. Limes are used for making a drink. Grape fruit is merely seen. The fig is seldom seen, although it seems to thrive. The date is occasionally seen, but is not prolific. The cocoanut is found along the seashore; trees producing about 100 each year. Thousands of acres could be planted and would no doubt yield profitable returns. The natives use the cocoanut almost exclusively as a drink before fully ripe; also, as a dulce, or preserve.

Of bananas, there are said to be eight varieties. This fruit is neglected and must look out for itself. It suckers to excess, thus draining the strength from the main stalk. It is extensively used as food by the laboring people. One variety, which we never see here, is called the "finger banana." It is very fine in quality, but too small to ship with profit. The plaintain is used extensively in place of bread. It is pulled green and baked, resembling a baked potato. We are told that the banana is one of the most nutritious of all foods, but from observations in Porto Rico among those who are said to live on it, I must say I have lost faith in that theory. People seem not to be well nourished or well developed physically.

The alligator pear is as large as two fists, with a large seed in the centre. The flesh is as insipid as a cantaloupe, without any taste. It is said to be quite nutritious, but is rarely seen in our markets, as it will not ship.

There are two varieties of bread fruit. One variety looks and tastes like boiled chestnut. The other variety is less common. There are a number of varieties of custard apple. One kind, when ripe, is eaten with a spoon. Coffee is the main product of the island, the annual exports amounting to ten or twelve million dollars. It is said to be superior to the Brazilian product. It is not generally sold in this country, being sent to Spain, France and Germany. The industry is said to be in a deplorable condition. There are two or three kinds of plums and cherries, but not the fruits we know by that name. The fruit is inferior, but makes a fair preserve.

The guava is a small fruit resembling a small apple, which seems to ripen nearly the whole year. It is used chiefly for jelly.

Several varieties of cactus bear fruit, but of no value.

The pawpaw is entirely different from our Pennsylvania fruit. It grows everywhere on the island and is wonderfully prolific.

The mango is a great favorite with the natives, and some almost live on this fruit. It is frequently as large as your fist, and is very difficult to eat without getting it over you.

The nispero, or medlar, resembles a potato or rusty peach or apple. It is much sought for by the natives.

There are six or seven varieties of palm beside the date palm. It is said one native can live on the product of a palm tree. The pomegranate grows everywhere. Some think it a fine fruit, but I consider it very inferior. The rose apple resembles our apple and has the odor of the rose. The fruit is not used at all. Of pine apples, there are three kinds, small, large and black. I have never eaten any equal to the Porto Rican fruit, and I saw there the most magnificent specimens I have seen anywhere.

The tamarind tree is one of the most beautiful on the island. At a distance it resembles the apple. The fruit resembles our peanut and is used for medicine. It makes also a refreshing drink.

Experiments thus far made in fruit growing in Porto Rico have been only in a small way and too feeble to show definite results. It is hoped those who go into the work in the future will do so on an extensive scale and will ascertain what can be done by cultivation and careful attention.

Of the fruits we have here, I have never seen pears or apples on the island. Saw grapes, but they are neglected. Peach trees grow and bloom, but bear no fruit. There is no evidence of any interest in fruit culture and everything seems neglected. The Mayberry was introduced in Porto Rico some six years ago, seems perfectly at home and does well.

ADDRESS OF SECRETARY HAMILTON.

The Chair.—We are fortunate in having with us this evening Professor Hamilton, the Secretary of Agriculture of this State, who will address us on

“The Necessity for Additional Legislation for the Protection of the Fruit Interests of Pennsylvania.”*

Prof. Hamilton.—I think those who have just had the pleasure of listening to Dr. Groff's lecture will conclude that the fruits of Pennsylvania surpass not only those of Porto Rico but of any other country. I have had expert fruit men tell me that the apples of this State are superior in flavor to those produced anywhere else in the United States.

*Like the remarks by Dr. Groff, those of Prof. Hamilton were not reported stenographically, and the Secretary regrets his inability to give more than a mere synopsis of his very interesting address.

When we undertake to grow fruit for flavor we will map the State according to altitude, soil, and climate, and thus locate the most promising sections for profitable fruit culture within our borders.

My topic for this evening is "The Necessity for Additional Legislation for the Protection of the Fruit Interests of our State."

It is only necessary to call attention to the extent of the fruit interests in this State, to convince you that they are worthy of the serious consideration of our Legislature. The only statistics that are available on this subject are those found in the census of 1890, from which we learn that in 1889, Pennsylvania produced 750,000 bushels of apples, 60,000 bushels of cherries, 117,000 bushels of peaches, 8,000 bushels of plums, 1,400 bushels of pears, representing an aggregate value or income of \$2,450,000. No doubt our recent census will show a large increase over these figures. There were 311 nurseries in Pennsylvania in 1889, with a capital of \$3,000,000, employing 612 salesmen, expending annually \$30,000 for advertising and \$22,000 in postage.

As compared with other States, in the cultivation of apples, Pennsylvania is somewhat behind. According to the same census, we had, in 1889, 750,000 bushels of apples, New York 8,000,000, Ohio 13,000,000, Illinois 950,000, Michigan 13,000,000 bushels.

Of peaches, Pennsylvania had 117,000 bushels, New York, 169,000, Virginia 105,000, California about 1,700,000 bushels. Pears, Pennsylvania had 144,000; New York 538,000, New Jersey 113,000, Ohio 277,000, Indiana 157,000, Michigan 194,000, California 577,000 bushels.

These figures show that as fruit growers we are behind other States that have not our advantages of soil and climate, and our position in the rear of the procession is not because we do not understand the proper care and cultivation of fruits, but in my opinion a large part of the difficulty is due to the fact that there has never been a properly organized effort on the part of the State to assist and encourage our horticultural interests. About all that has been done has been the work of this Association of horticulturists who meet annually to compare notes and experiences and who pay their own expenses. New York has made great advances in her fruit industry in the past twenty years. During a trip through that State last fall I saw, at Geneva, two large canning establishments, one of which canned 30,000 bushels of apples in a year, making not only satisfactory profits, but creating a home market for the surplus fruit of the vicinity. Here, in Pennsylvania, with every natural advantage almost nothing is being done to promote similar industries.

Another point. Here, in Pennsylvania, we have to some extent

become the dumping ground for refuse nursery stock from every section of the United States. There is no legislation to protect our fruit men from San José Scale or diseased or infected nursery stock brought in from other States.

In the matter of existing legislation, we have laws protecting orchards from depredations. No one is allowed to steal our fruit or break down our trees. We have also a law enacted two years ago relating to San José Scale, yellows, black knot, etc. I do not know that this law has anywhere been enforced. According to its provisions orchards may be inspected and if condemned may be destroyed, but up to this time I know of no instance where any one has been prosecuted in Pennsylvania for non-compliance with its requirements.

The Department of Agriculture has appointed experts to inspect nursery stock. A certificate from these experts enables our nurserymen to ship trees and plants outside of the State, but there is no law to prevent nurserymen from selling infected trees anywhere within the State.

The Department also issues bulletins from time to time, which have done good service in enlightening our citizens on the subject of injurious insects and diseases. Some of our nurserymen have erected fumigating houses, where all nursery stock is properly fumigated before shipment, thus taking all possible precaution to prevent the spread of insect pests.

The Department has also secured a list of fruit growers of Pennsylvania, and is now able to assist them, through the distribution of bulletins, giving information in regard to insect pests and fungi and methods of counteracting their ravages. In the report of this Department for 1899, the proceedings of this Association for 1898 and 1899 were published and distributed.

We need additional legislation. We need a law that will control insects and fungous diseases, a law that is not too radical but that will permit the destruction of trees that are too badly diseased or infected to recover. With that end in view I have prepared a bill which I will submit to the consideration of your Association. It is made up of extracts from the New York and Missouri State laws.

There is another law needed which I have not been able to prepare in reference to fruit packages. There should also be a law creating a Division of Horticulture and Pomology, in charge of an officer who will look after the interests of horticulture. The sooner such a law is enacted the sooner will the fruit interests of the State receive the attention and encouragement which they deserve.

DISCUSSION.

Mr. Wertz.—I would like to ask Prof. Hamilton whether he is familiar with the Maryland State law.

Prof. Hamilton.—I think the Maryland law is too severe, and might not do as much good as one that is less stringent. In that State the officials have gone into orchards and torn out and destroyed trees by thousands. Of course, where trees have yellows, it is necessary to dig them up and burn them, but where they are infected with San José Scale it is not best to act rashly. If we find we can control the scale, it may be better to do so than to destroy the trees.

The Chair.—I have followed the reading of the proposed bill carefully, and as an orchardist and grower of nursery stock, I think it fair and comprehensive, and it ought to be reasonably effective. I can see nothing in it that is objectionable, and I hope before we adjourn this Society will endorse it.

Mr. Moon.—I heartily endorse the remarks of Prof. Hamilton in every particular. The bill, as read, is the most comprehensive we can expect, and will, I think, fully meet all requirements, and as a member of the Committee on Legislation, I hope it will be endorsed by this Society.

Mr. Wertz.—In speaking of the fruit industries of Pennsylvania, as shown by the census of 1890, Prof. Hamilton placed the peach crop of this State in 1889 at 179,000 bushels. I know that Franklin county alone shipped a greater quantity last year than the entire State in 1899. As to the proposed law just read by Secretary Hamilton, there are some features about it that scarcely go far enough. As I understand it, it makes clear my duty when I believe I have San José Scale or yellows, or other diseases in my own orchard, but what redress have I if I know or believe my neighbor, who may be careless or indifferent upon this important matter, has an orchard that is infected? Will it meet such requirements? Again, I am told it would be practically inoperative unless it carries an appropriation to cover the necessary expenses incurred in its enforcement. The great State of Pennsylvania should not hesitate to grant an appropriation to protect one of its most important industries, which may be doomed to destruction unless a law of this kind be enacted.

Mr. Moon.—I would disapprove of any bill that will make fumigation compulsory. It may be proper so far as fruit trees are concerned, but to compel the fumigation of conifers and evergreens would be almost certain destruction, and would mean the ruination to the business of such nurserymen as made that branch of the business a specialty.

Mr. Brinton.—That is a point well taken by Mr. Moon. Fumigation would entirely kill evergreen trees. A distinction should be made in case such a law is enacted.

Mr. Longsdorf.—It has been suggested that an effort be made to establish a Division of Horticulture and Pomology in the Department of Agriculture. Why could not this be made a part of the bill just read? Why not an officer to give this matter special attention?

Mr. Edge.—The idea advanced by Secretary Hamilton, to accomplish this by a separate bill, is best. It is unconstitutional to pass a bill containing more than one subject.

The Chair.—While I believe in the fumigation of fruit trees, it would hardly be fair to compel the nurserymen of this State to fumigate so long as those from other States can ship their stock here without fumigation. I hope we will have some legislation in favor of a Division of Horticulture and Pomology, and I trust our Committee on Legislation will formulate a bill to this end.

On motion, the subject was referred to the Committee on Legislation, whereupon the Association adjourned until 9 A. M. Tuesday.

Tuesday, January 22, 9. A. M.

Reports of special committees being in order, Mr. Hiester, of committee appointed by this Association at its last annual meeting to attend a conference of representatives from the several agricultural and kindred organizations of the State to consider the subject of "Agricultural Education," submitted the following report:

REPORT OF SPECIAL COMMITTEE.

On the 4th and 5th of June last a conference of representatives from the various agricultural organizations of the State was held at State College, upon the invitation of the State Board of Agriculture, to consider "the Present Condition and Needs of Agricultural Education in all its Branches in this Commonwealth."

At this conference, thirty-two delegates were in attendance, representing the following State agricultural organizations, together with the Department of Public Instruction:

State Department of Agriculture,
State Board of Agriculture,
Department of Public Instruction,
State Grange,
State Alliance,
State Agricultural Society,
State Horticultural Association,
Pennsylvania Dairy Union,

State Breeders' Association,
Guernsey Breeders' Association,
Pennsylvania Jersey Cattle Club,
State Poultry Association,
The Pennsylvania State College.

After organizing by the election of Hon. N. C. Schaeffer as chairman, and Dr. H. P. Armsby as secretary, the various delegations were asked for an expression of views and a full and free conference and discussion was had. Following the discussion, an executive committee of one from each organization was appointed to formulate the conclusions reached. At the closing session, the following resolutions recommended by that committee were unanimously adopted by the conference:

Resolved, That it is the sense of this conference that nature study should be introduced into the public schools of the State.

Resolved, That this conference request from the next Legislature an appropriation of \$10,000 per year, for two years, for The Pennsylvania State College, to defray the expenses of continuing the preparation and distribution to the teachers of the public schools of the State of bulletins and leaflets on nature study, with special reference to agriculture.

Resolved, That this conference urges the Legislature to provide for carrying into effect the act of June 28, 1895, providing for the establishment of township high schools.

Resolved, That we request the State Legislature to make a sufficient appropriation for the erection and maintenance at The Pennsylvania State College of a suitable building for the teaching of the different branches of agriculture, including dairying and forestry.

Provision was also made for a legislative committee of five members "to formulate and urge the legislation asked for by the conference," and the several delegations were likewise charged with the duty of presenting the matter to their several organizations and securing their active support for the work of the legislative committee.

LEGISLATIVE COMMITTEE.

The legislative committee, as subsequently appointed by the chair, consists of

Hon. John A. Woodward, Chairman, Howard.
Hon. Hiram Young, York.
M. N. Clark, Claridge.
Howard F. Chase, Philadelphia.
S. F. Barber, Harrisburg.

EXECUTIVE COMMITTEE.

State Department of Agriculture,	Hon. Jno. Hamilton.
Department of Public Instruction,	Dr. N. C. Schaeffer.
Pennsylvania State College,	Col. Jno. A. Woodward.
State Grange,	M. N. Clark.
State Alliance,	A. G. Brown, Jr.
Dairy Union,	S. F. Barber.
State Agricultural Society,	Hon. Hiram Young.
State Horticultural Association,	Prof. S. B. Heiges.
State Breeders' Association,	W. H. H. Riddle.
State Poultry Association,	J. D. Nevins.
Guernsey Breeders' Association,	Jno. I. Carter.
Pennsylvania Jersey Cattle Club,	W. F. Wagner.
State Board of Agriculture,	R. J. Weld.

In the estimation of your committee this was one of the most important meetings ever held in this State in the interest of agricultural education, and we never saw at any meeting of representative farmers, such perfect unanimity of sentiment. There was no clashing of interest, no exhibition of jealousy, but each one vied with his neighbor in urging on the good cause, and each resolution received the unanimous and hearty support of the entire meeting.

Respectfully submitted,

GABRIEL HIESTER.

DISCUSSION.

Mr. Edge.—As this report recommends the appropriation of several distinct amounts for different purposes, I would suggest that Mr. Hiester designate the most important, and that special effort be made to have favorable action by the Legislature.

Mr. Hiester.—I think the committee has already designated which are most necessary. While the State has been very liberal in some respects toward the State College, the agricultural students have been so cramped for room during the past two or three years that many have been turned away. I think the time has come when agricultural students should have similar accommodations to those furnished students in engineering and other branches.

Mr. Edge.—There is no doubt the College ought to have a dairy building.

Mr. J. A. Herr.—A great deal of abuse has been heaped upon the State College. They have a school of three or four hundred students, a small proportion of whom are in the agricultural building. A few thousand dollars have been spent on this building, while on the building devoted to engineering several hundred thousand have been expended. It looks as if agriculture was only being made a secondary study, but it is not neglected. We want and need and demand the aid asked for.

The following was offered by Mr. Moon:

AGRICULTURAL EDUCATION.

Resolved, That this Association regards the question of agricultural education as one of the greatest importance, the continued prosperity of our agriculture, the foundation of all material well-being, depending in large measure upon the proper education of the farmer.

Resolved, That we cordially endorse the measures for the promotion of agricultural education in this State proposed by the conference of State Agricultural organizations of June 4 and 5, 1900, and that we urge the Legislature to give favorable consideration to the same.

Resolved, That the delegates to the conference be continued as a committee of the Association and instructed to co-operate with the legislative committee of the conference in securing the desired legislation.

Mr. Moon.—I offer these resolutions and hope they will be adopted as expressive of the opinion of this association. I desire also to express my sentiments as to the great interest shown by Secretary Hamilton in the welfare and success of this Association, as well as by the bill drawn and submitted to our members. I trust the resolutions may be adopted and that Prof. Hamilton may know that the interest manifested in our Association and its work is appreciated.

The resolutions were, on motion, adopted.

REPORT OF COMMITTEE ON NOMINATIONS.

Mr. Moon, of Committee on Nominations, submitted the following list of candidates for the several offices of the Association for the coming year:

PRESIDENT.

Howard A. Chase,Philadelphia.

VICE PRESIDENTS.

Calvin Cooper,Bird-in-Hand.

W. T. Creasy,Catawissa.

M. C. Dunlevy,Carnegie.

RECORDING SECRETARY.

Enos B. Engle,Waynesboro.

CORRESPONDING SECRETARY.

Wm. P. Brinton,Christiana.

TREASURER.

Samuel C. Moon,Morrisville.

Mr. Snively was requested to cast the ballot of the Association for the aforementioned candidates, and they were declared duly elected.

After announcing the result of the election, and thanking the Society for the honor conferred, the President stated that the next business before the Association would be the selection of a place for next annual meeting.

Mr. Creasy invited the Association to meet at Bloomsburg, and promised to make special efforts to have a good meeting. It is a live, enterprising city, and can be reached by the Pennsylvania, Philadelphia and Reading and Lackawanna Railroads.

On motion of Mr. Moon, Bloomsburg, was agreed upon by a decisive vote.

The following paper was then read:

HORTICULTURE.

W. H. STOUT, *Pt* *cc. Pa.*

It is remarkable, after devoting a lifetime to horticulture how much one learns, and it is surprising how little one knows after having learned so much. The allotted time of human life is too short to learn more than a trifle of the mysteries of the art, and were it not that we had the contributions of early investigations in various countries, notably Linnæus, Grey and Darwin, we would know still less. The mysteries of protoplasm, the life principle of plants, the color, form and flavor, are as yet imperfectly understood, and until instruments of greater magnifying power than any available now are devised, it remains impossible to observe the infinitesimal quantity of the life principle of cells composing vegetation. The rapidity of growth indicates the multiplication of cells, each one distinct, embracing within itself a germ which, if it might be separated and propagated, would reproduce a plant of the parent variety. By peeling the bark from an apple tree during the season of most active growth in this latitude in June, the cells composing the sap will be seen to rapidly deposit on the wood and spread over the surface that a film will soon be formed and the tree again covered by the protecting bark, which remains smooth for about ten years before the cork or rough bark again appears on the surface.

If we were on the summit of the Blue Ridge (Kittatinny mountain), between and beyond the east branch of the Schuylkill river and the Swatara, we would see the second mountain to the north at about the same elevation of 1,500 feet, between which lies a valley several miles wide, which forms a portion of the agricultural soil of Schuylkill county. A closer examination would reveal lower ridges running parallel with the higher mountains, sub-dividing the main

valley into four narrower belts, each one of a different geological formation, and the whole a beautifully rolling landscape decked with clusters of evergreens, and a great variety of forest trees and shrubbery indigous to the soil and climate. The soil in general is not stored with fertility, being composed of clay, shale, sandstone and fine pebble rock, everywhere standing from a steep angle to a perpendicular, so the soil varies with the numerous stratas of underlying rock. In this valley, as also in others around the coal basin, horticulture is a leading industry to supply the wants of the mining population, and while general farm crops are produced, a noted change has taken place in a decade, since it was demonstrated that vegetables and fruits sent to the coal regions in years past from other sections can be produced to advantage, and delivered fresh, crisp and tasteful to the consumers. Under the impulse of better profits and a demand for good products there has been developed a class of progressive farmers and horticulturists, who have improved on the Darwinian theory of the "survival of the fittest" in the struggle for existence, so that we claim for the Schuylkill county farmers a degree of intelligence, industry and thrift not essential in more favored localities where nature provides without so much effort, the necessities of existence. Upon the subject of "Experience in Fruit Growing," a term of nearly thirty years' effort, the experiences are many and varied, so that what I had would make a volume and what I did not have would make an encyclopedia.

In purchasing trees, every planter has experiences, very often of a disappointing nature, and to avoid some of the disappointments or deceptions I grafted many of my trees raised from seedlings and topped over some that were not the varieties wanted. As a retail fruit grower, my purpose was to have a succession for market, in which I succeeded, making the mistake, however, of getting too many early sorts that are perishable, and while always saleable in moderate quantities, any surplus obtained is largely wasted because they are on hand during the busiest part of the summer, when labor is more profitably employed than in drying apples and cider making. The succession consists of Red Astrachan, Early Harvest, Early Ripe, Strawberry, Webbers, Summer Rambo, Jeffries, Maiden Blush, Smith's Cider, Smokehouse, Red Sweet, Fall Rambo, Ewalt, Northern Spy, Dominic, Baldwin, Hubbardston, Pound, Red Romanite, Grimes' Golden, King, Belle Flower, York Imperial, Pennock, Paradise Sweet, Winesap, Rawles Janet, besides several unknown varieties, gives us usually a regular supply. Having a market near at hand for almost anything we can produce on the farm our crops are various, consisting of strawberries, raspberries, currants, grapes, pears, peaches, plums and vegetables adapted to the locality, besides

poultry, honey, butter and milk. Necessarily, in this occupation, the experiences are various, requiring constant industry and care, as well as some business knowledge and the application of the best known methods for the production of the various crops to meet a growing competition and low prices.

Almost every person having land under cultivation aspires to do marketing, so that during the season many attend market at times; persons who do not know the value of their products and sell at almost any offer that is made, so that unless a superior article is produced of merited superiority, put up in attractive form and brought around with some regularity it becomes discouraging and not a few, after demoralizing the markets, quit in disgust. In order to be successful in producing the best of everything, requires more than ordinary care in the selection of soil, location, cultivation and fertilizing, as well as incessant work combating the many insects and fungous diseases, besides condition of weather which cannot be so well guarded, only modified to an extent. The fertilizer question especially concerns the fruit grower and market gardener. Homeopathic doses, such as are applied to ordinary field crops, are not sufficient to produce quickly and profitably many of the articles referred to. The average farmer considers a 400-pound application of a "phosphate" as an extra heavy dose, and often produces remarkable results, which appears the more remarkable when a calculation is made of 43,560 square feet in an acre of land and that about one-seventh of an ounce only is applied and more often only half as much is used, only one-fourteenth of an ounce to a square foot, is condemned. The contingencies to success are many, too wet or dry, storms, especially hail, fortunately limited in area usually and if the results are not visible as far as sight reaches, the fertilizer proves severe loss at times. A French discovery recently indicates the way to avoid damage from hail, and perhaps it will be necessary to each farmer, besides his force pumps, squirt guns, powder bel-lows and general outfit to arm himself with a cannon-like weapon ready charged, so when a hail storm approaches a few discharges of his mortar-like gun will cause an atmospheric agitation to disseminate the frost laden clouds.

To get there first, if some distance away when a storm approaches at a thirty-mile gait, will probably require some training from which most old men would rather be excused, especially if not trained on the diamond or the football field. I am satisfied, after experimenting, that trimming, thinning fruit, heavy fertilizing and spraying are all necessary practices to produce first class fruit. It is surprising, after all that has been said and printed on the subject of spraying, that it is so little understood. The blossom of fruit is very delicate, yet thoughtlessly some persons are stupid enough to de-

stroy them by spraying when the blossoms are open, which is almost certain to be fatal to the delicate stamens and pistils of fruit blossoms. From experience I am satisfied that fertilizing and cultivation are the principal factors to produce first class fruit, and on all apple trees it is safe to use stable manure freely, while on peaches the various commercial substances, potash, phosphoric acid and nitrate of soda, are preferable, and stable manure had better be used on other crops. It has been recommended in starting an apple orchard, to plant alternate, peach trees as fillers, while the apples are young, with a view of utilizing all the ground and produce several crops of peaches while waiting for the apple trees to mature. This practice is, however, not to be recommended because the same soil is not adapted to the successful growth of trees so different in nature. The apple thrives best in a rich, fine and deep soil, while the peach does better on a coarser, light soil, not so rich in humus, and not necessarily so deep. The pursuit in which I am engaged affords a good field for observation and study, not alone on the lines of crop production and their sale, but also in the study of human nature. Some persons met with are ladies, some are women and others are something else, who are never satisfied, denominated by some writer as "bargain buyers," and the fewer of this class one has on his roll of custom the more composure may be enjoyed. In the masculine form, too, there are various characteristics, and some of the hardest to please is a class of economists who are so prudent in spending money that they would rather set them up three for a quarter than take a whiskey straight for two nickels, just to save five cents.

Cleanliness is said to be next to godliness, and we aim to have all our produce in attractive form, upon which a reputation depends, and it is not often carried to excess by market men, but it may even be overdone. A case in point occurred in one of our country towns where a market woman, offering cottage cheese to a patron after measuring it out with a ladle to prove that she was a careful, cleanly housekeeper, licked the adhering cheese from the ladle and replaced it in the unsold remainder, thereby losing for herself and all other hucksters a good cheese customer, with no advantage to any but the family cat which was benefitted. With the advent of the twentieth century the prospects for the horticulturist looks promising for an increasing demand at home and abroad for choice products, but competition is also growing, so that those who would succeed must study as never before the practical and scientific parts of their business. The hedge row productions which are common in our markets will not be marketable in the near future, as tastes are getting more fastidious and the consumers more discriminating. Ordinarily, water is cheap and may be used to good advantage (not

in milk), but in cleaning market products, as well as the conveyance, and wouldn't be wasted on the persons of some going to market.

I believe in patronizing the barber occasionally and in wearing a clean, decent suit of clothes, also in the use of brush and blacking before starting on a market trip. We pick all apples carefully and sometimes choice lots are rubbed with a cloth to make them more attractive. Necessarily the expenses in doing business in this way are heavy, and whether the retail prices obtained are more or less compensating than wholesaling or sending on commission I am unable to state, but about the latter method serious doubts are entertained from a very small experience. One of the difficulties is to get reliable help at times, and all the time it is difficult to obtain help that can be depended upon to do things as they should be done, because the average help considers the time put in of more importance, than the labor performed, going on the principle of "come day, go day, God send Sunday," a holiday or a picnic.

For two successive seasons the peach crop in our section was almost a total failure. In February, 1899, being very cold, following a few moderate days of a drizzling rain, froze a coating of ice on the twigs, either smothering or freezing the buds. Last spring, again in March a sudden change of temperature after a mild spell, destroyed almost all the fruit buds. In a few sheltered locations some buds escaped and a few peaches were obtained, but only an insignificant quantity. After the freeze of two years ago I topped all my trees to short arms and succeeded in forcing a new growth, which were thrifty and full budded, and what are left are yet in good shape to produce fruit with favorable weather conditions. So far the Iron Mountain and Old Mixon are the most hardy and less affected with yellows and fruit rot of the various sorts growing. Regarding diseases and injurious insects, we have in my section I think about all that are named in the catalogues, so if any entomologist here or elsewhere desires to increase or form a cabinet he might do well to visit us and collect all the bugs, beetles, butterflies and worms found, and be welcome to them without money and without price.

In the absence of the writer, the following was read by the Secretary:

HORTICULTURAL DISPLAYS AT FAIRS.

BY OLIVER D. SCHOCK, *Hamburg, Berks Co., Pa.*

The wonderful old myths which the great scholars expound, telling us that the forces of nature were the gods of the ancients, as, for example, identifying the sun with Phoebus Apollo; the moon with

Diana; the fruitful earth with Ceres; the grey sea with Neptune and the blue air with Minerva, all of these attract the attention of the thoughtful and thus link us more closely with the mysteries of the air, earth, water and their varied creatures. As a natural result, the developments of science have been far more numerous and of greater benefit than ever before, many discoveries having been revealed which but a few years ago were regarded as insurmountable difficulties. Questions of economical utility, which at one time appeared to be unsolvable, are now made plain, and appear as simple but valuable lessons in practical horticulture.

Although the orchards, vineyards, gardens and fruit farms may be regarded as of man's devising, we all, perhaps, covet and cherish a certain domain, under whatever limitations, where the children played, the middle-aged rested, and the old began to grow garrulous and dream and play again, recalling the promises of youth, and meditating over those which remain unfulfilled. It is while in this contemplative mood that the speaker deplors the fact that horticulture in Pennsylvania has suffered much loss because of its practical separation from agriculture, and the lack of the financial support that has hampered the work and operations of the State Horticultural Association in the past. This, in a measure, may have been due to the fact that too many of us have concentrated our gaze on minute attractions and thus lost sight of some of the greater opportunities; but the eye is not always focused on the immaterial things of our lives, and as an Association, let us hope for the hearty co-operation of the Legislature now in session, and that they may accord to us the support and encouragement that this great interest represents, and fully deserves.

The cultivation of fruit in Pennsylvania shows most marvelous advances, and long before the white man undertook to possess or subdue what is now the greatest and grandest State in the Union, small fruit of many sorts were a natural production of its soil. But it is only when we visit the leading county fairs that we can comprehend and realize the extent and meaning of the great progress that horticulture has made in this State. Throughout the greater part of the State, apple trees are thrifty and good bearers, producing fine and highly colored fruit, many varieties being notable for their good-keeping qualities. Some of the native varieties have won an almost national reputation. The pears and peaches of Eastern Pennsylvania are unsurpassed, while the famed peach belt of Southern Pennsylvania has also been the surprise and admiration of some of our most noted pomologists. The pears of Montgomery and Bucks counties have a most excellent reputation in the Philadelphia and New York markets, as quite a number of growers have succeeded admirably in the culture of this delicious fruit. Im-

proved varieties of cherries, the Heart, Bigarreau and the Duke and Morello types, are in increased supply and demand, and, in general, fruit growing has attained a higher position than ever before in the history of the State. The displays of grapes are larger than ever before, while small fruits, such as the strawberry, raspberry, blackberry, currant, etc., are a profitable adjunct to the crops of many successful and leading farmers.

Of course, a large measure of this prosperity is due to the increased knowledge how to grow fruit and to combat the various enemies that in many instances made the production of sound fruit an impossibility. The important factor of convenient and rapid railway facilities has very greatly contributed towards making fruit growing profitable, as we are now able to ship fruit to markets thousands of miles distant. The exportations of apples to European ports is only in its infancy and the trade will assume immense proportions in the near future, as the American apples are in demand above all others, and realize profitable prices.

The importance of the State and county fairs in educating the people in relation to the varieties and qualities of the choicest productions of the orchard and vineyard must not be ignored. By educating the visitor you will tempt both the eye and pocketbook. The displays made at the Lehigh, Berks, York and other county fairs deserve our highest commendation. The Inter-State Fair, held at Trenton, N. J., also has a display of fruit that ranks second to none, a considerable proportion coming from Pennsylvania fruit growers. In many cases the premiums awarded for the largest and best collections made by a single exhibitor are exceedingly liberal. The newer varieties, as well as seedlings, are usually recognized and premiums awarded where the exhibit is meritorious. Unless, in the case of seedlings, fruit must be correctly named or it will be disqualified from competition.

Many of the leading societies will not have a judge from the home county to award the premiums; neither will they permit the name of the owner to be attached to the display. It is only after the awards have been certified at the secretary's office that the identity of the owners can be made known. This plan has worked most admirably, as it relieves both the society and judges of the charges of partiality or unfairness.

A serious problem in the awarding of premiums has been in the matter of the number of specimens of a variety that should constitute an exhibit. In many cases the premium list would call for the best plate of five specimens of a kind. In some cases an apple may be removed by a visitor or by an interested party, thus falling short of the required number; in other cases, innocent exhibitors may unwittingly add a superfluous apple. In all such instances, the plate of fruit was not recognized for competition.

The nomenclature problem is entitled to a great deal more attention than is usually accorded to it. At a fair which the speaker attended last fall, certain well-known varieties were designated by conspicuous cards by the rather startling names, "Bull Apple," "Stallion Apple," "Slaughter Apple," etc., and other names equally new to pomological literature. Near the same exhibit was the display of a modest farmer who displayed fifty varieties, all free from imperfections, because he sprayed his trees, while every variety was correctly named. To prove that "mistakes will happen in the best of families," the speaker will merely mention the fact that at a session of the American Pomological Society, held at Philadelphia, some one had inadvertently placed an exhibit of the Japan golden russet pears among the several varieties of the russet apples.

No single association has done as much for the dissemination of pomological knowledge as the State Horticultural Association, with the assistance received by the officers and members of the county agricultural organizations. They are the medium by which those directly interested can best be reached. Greater harmony and uniformity, so far as the naming, displaying and examination of fruits, as well as the general principles which regulate awards of premiums, is needed.

Nature evidently intended Pennsylvania for a great fruit garden to supply the denizens of New York, Philadelphia, Pittsburg and other places now within easy access through the means of the railway facilities which we have at our command. If we but do our full duty, horticulture will be no longer only an accompaniment to farm life. The State and county fairs are awakening to the duty, as the enlarged premium schedules will attest. The Commonwealth should also render that practical help that this association requires to make the best possible showing. William Penn, writing in 1683, mentioned the fact that "chestnuts, walnuts, plums, strawberries, cranberries and whortleberries were growing abundantly in the woods," and also referred to the great abundance of grapes. He declared that in his opinion a thing would grow best where it grew naturally. Would that it were possible for Penn to visit some of the orchards and vineyards that are the pride of Pennsylvanian's to-day!

The writer begs leave to incorporate the following ideas and suggestions for your attention, and discussion, if time permits:

1. Increase the scope and extent of horticultural displays at State and county fairs by offering more liberal premiums. Do not fail to make them as liberal as possible.

2. Do not fail to offer premiums for new varieties that may be considered worthy of dissemination. A new variety of apple on exhibition may attract as much attention as the largest pumpkin.

3. Do not fail to include seedlings in your premium list; bear in mind that several of the best and most popular apples now grown in this State were the result of chance seedlings. If the quality is inferior, no premium should be paid, regardless of its appearance.

4. Insist that all kinds of fruit shall be properly classified and arranged to the best possible advantage for both the exhibitor and visitor. Where the entries of fruit are large and the competition is sharp, it is better by far to have the fruit arranged alphabetically; for example, in the case of apples, starting at the head of the table with plates containing such varieties as the Alexander, Baldwin, Chenango, etc. This not only saves time, but is fairer to both exhibitor and judge, as the plan will prevent the possibility of overlooking an exhibit, as is frequently the case when exhibits are not placed together or within easy reach.

5. It is not advisable to award a regular premium to a mis-named exhibit; if the judges cannot decide as to the true name, and a premium should be awarded, it is better and more honorable to make an award "to an unknown but worthy variety."

6. Where the exhibitor makes a display of fruit that is free from blight, fungi and the ravages of insects, let the judge give the exhibit preference, rather than award the premiums to some abnormally large and worm-eaten specimens, as is too often the case.

7. Be on the lookout for the pernicious San José Scale. The speaker discovered some fine specimens of the Clairgeau pear at a fair that were completely covered by the markings peculiar to the scale, although the owner had not recognized their true character. In such cases it is best to remove the fruit so affected and destroy it without delay.

8. Do not allow color alone to influence your work as a judge in awarding premiums. The same variety of fruit, taking apples as an example, will show strong variations in type, according to the location and age of the trees, nature of soil, shade, fertilization, etc. The most expert judges are frequently puzzled, and in such cases it is well to act slowly and carefully to avoid mistakes and the injustice that would be inflicted on the exhibitor.

9. If it is impossible for a society to offer premiums, however small, for all varieties, let them recognize the leading standard varieties, and incorporate the remainder into contests for the best collective prizes. Such collections in many cases will instil greater competition than the awards for single plates.

10. Do not fail to revise your premium lists, and make the changes that may be demanded with honor and fairness to all parties interested. You cannot afford to do an injustice either to the exhibitor or to the society. Their interests are mutual, and they must work together to produce satisfactory results.

11. Do not fail to create and stimulate an increased interest in floriculture, as horticulture and floriculture walk hand in hand. Fairy-like gardens help to make happy homes, besides, in many instances, affording a fair financial return. Many of our best farmers and fruit growers have realized considerable gain from this source during the past few years.

12. There is probably no class of men that are more often the subjects of base deception than the progressive horticulturists, for the reason that his desire for knowledge and pecuniary benefits impels him to invest in almost every new thing that promises something for his good or welfare. Again, he knows what is wrong when he sees some great display of fruit competing for premiums when made by a party who does not cultivate or own even a fruit tree or vine.

13. Do not condemn the fruit tree agent too severely; he has been the means of putting thousands of thousands of barrels of fine apples upon the market, and made plethoric the pocketbooks of hundreds with the profit of fruit-growing. If it were not for the operations of the fruit tree agent, we would not have any large displays of fruit at our county fairs to-day.

14. In conclusion, permit me to add a brief plea in behalf of our feathered friends and songsters—the birds. Let every horticulturist aid in preventing their wanton destruction. Remember the fact that they are usually most abundant in the orchard and vineyard where the insect enemies of the fruit grower are the most abundant and injurious. These songsters are but aiding us in our humble efforts to produce better and more perfect specimens of fruit, whether for the market, family, or to display at some important fruit show.

DISCUSSION.

Mr. Jamison.—This is a very good paper and I would like to see a copy sent to each officer and member of fair organizations in the State. I know our eastern counties are alive to the interests of horticulture, but when we go westward these interests are neglected. I have seen as fine fruit exhibited in Juniata county as has even been grown, and no mention made of its exhibit. As to the number of specimens that ought to be placed on each plate, I think five is all right where there are but few varieties, but where the exhibit is large three specimens would be sufficient.

Mr. Herr.—As to the arrangement of exhibits in alphabetical order, is it not better to arrange them in the order of ripening. I can appreciate the importance of having as judges at our fairs men who are posted on the different varieties of fruit and competent judges. I had the honor once of acting as judge at a fair at York.

Pa., with H. M. Engle and Casper Hiller, and it was one of the most satisfactory experiences I ever had.

Mr. Longsdorf.—There will always be more or less difficulty in judging points until we get rid of synonyms. The trouble will be materially lessened when the same variety is known everywhere by the same name. In this connection, I want to state that in a visit to my brother's nursery last season I saw a striking instance of cross fertilization. Two apple trees, a York Stripe and Mumper's Vandevere standing so closely that the branches touched, bore fruit that showed marked characteristics of both varieties. I had seen similar cases previously in our county. It is known too that fruits vary considerably in different localities, and this is another cause of trouble and confusion in the proper judging of fruits.

Mr. Herr.—The question of fertilization is an interesting one and deserves more attention than is usually accorded. I have in mind one of the largest apple orchards in my county. It was planted years ago with great care, received good attention and the owner had reason to expect great results, and yet it proved an entire failure. The varieties were planted in large blocks and failed to fertilize properly. After years of repeated failure, other varieties were planted among them and it now bears good crops. It is known also that certain varieties of plums and pears will not bear unless fertilized by other sorts.

Mr. Brinton.—One gentleman spoke of a change in the character and appearance of fruit the same year by pollinization. I think this is contrary to the law of cross fertilization, and it will be well for the society to consider before committing itself to this idea.

Mr. Longsdorf.—I tried to get specimens of fruit to exhibit here, but could not do so. I could convince any member of this association that there was a mixture or cross in the case referred to.

Mt. Stout.—I think pollen may, in some cases, have immediate effect, as in corn, for instance. The same may be the case with some varieties of fruits.

Mr. Peters.—It is said that a gentleman in New Jersey improves his York Imperial by fertilizing with Ben Davis.

Professor Craig.—This somewhat new question of how to plant our orchards so that interpollination will take place naturally and thoroughly, is one of the most interesting subjects connected with the study of horticulture. While much work has already been accomplished in this field by observant fruit growers, by the Department of Agriculture at Washington, and the experiment station workers, there is yet a great field awaiting exploration.

It is not safe to make generalizations based on scanty data, but it does appear safe at the present time to place the results of our investigations under three different heads. First, let me say that,

of course, no one questions the benefit of cross fertilization in fruit growing. It has been announced by Darwin that "nature abhors self-fertilization." This is a generalization, of course, but it is essentially true; and the numerous devices to bring this about, with which flowers of the different orders of plants are supplied, only emphasizes the desirability of man following up the cue which nature has given him and planting his trees in such a way that interpollination may take place with a fair degree of certainty. Of course, some varieties of apples are self-fertile, like the Baldwin. Again, other varieties are self-sterile in part, like the Northern Spy, and many of the newer kinds recently being introduced from the Ozark regions. The beneficial effects of cross-fertilization, then, may be briefly stated under three heads, and these generalizations are based on actual experiments which have taken place during the past ten years: (1) The yield of fruit may be increased; (2) the size of fruit is frequently increased; (3) in some instances the appearance of the fruit is modified. These changes in color and form are less constant and more fortuitous than the increase in size and yield, but all orchardists have had occasion at some time or other to note the changed appearance of a row of Greenings standing along side of a row of Baldwins or Russets, for instance. This would look like an effect of the pollen on the fruit of the same season. Here we have an unusual result, because, as a rule, cross-pollination does not affect the fruit, that is, the horticulturist's fruit, the same season.

Hon. Thos. J. Edge, formerly Secretary of Agriculture, then favored the Association with a very interesting address on his recent trip around the world.

On motion, a vote of thanks was tendered to Mr. Edge, whereupon the Association adjourned until 2 o'clock.

Tuesday, January 22, 2:30 P. M.

Having called the meeting to order the chair announced the following appointments:

Delegates to the Annual Meeting of the State Board of Agriculture: Wm. H. Moon, J. E. Jamison, E. W. Thomas, Wm. H. Stout and Daniel D. Herr.

Henry C. Snavely was appointed chairman of General Fruit Committee.

"Spraying, Its Uses and Abuses," was the subject of an oral address by Calvin Cooper, Bird-in-Hand, Pa. The following is a brief report of his very practical remarks:

In order to spray successfully, the chief points are, first, a good force pump, with adjustable nozzle. It is almost necessary to have two spraying implements, a knapsack sprayer for small trees or shrubbery, and a barrel pump to reach trees thirty-five to forty feet in height. Second, the first spraying of the season should be done in early spring, before the tree is in foliage; and where pruning is necessary it should be done before spraying. Under no circumstances should trees be sprayed when in bloom. For mildew and fungous diseases there is no better application than Bordeaux mixture, which should always be used soon after it is made. In my experience I have found it dangerous to make this mixture long before using it.

As an insecticide, I have found Paris green most economical and satisfactory. A good, strong pump, with horse, wagon and boy are necessary for efficient work where trees are twenty-five to thirty-five feet high. At first I used three-fourth inch hose, but found it unnecessarily heavy. One-half inch is amply large. A good stout boy is able to handle the pump and to force a spray so fine as to resemble smoke a distance of twenty-five to thirty feet if the weather be calm and favorable.

It is my practice also to continue the use of fungicides in the third and fourth sprayings. When dashing rains occur within a week or ten days after spraying a large per cent. will be wasted, and it will be necessary to repeat the work.

I have also found that the sprayer can be used for whitewashing fences and buildings, for washing windows and for similar purposes.

One of the common abuses of spraying is to spray when trees are in bloom. Another is to use insecticides when fungicides are needed and *vice versa*. We must first know what the trouble is and what is needed and spray accordingly. If for insects, a poisonous material only is needed. If for blight, mildew or similar plant or tree diseases, fungicides should be applied. There are times when both poison and fungicides can be combined and applied advantageously at one operation. For such application the following is generally used:

Six pounds sulphate of copper, four pounds fresh lime and one-fourth pound Paris green to fifty gallons of water. I have also used Hellebore, London purple and tobacco as insecticides for specific purposes, and with success, and for scale insects have found crude petroleum satisfactory. My experience with refined petroleum has not been satisfactory.

Mr. Moon, chairman of Committee on Legislation, submitted their report, which, after some discussion, was accepted.

On motion of Samuel C. Moon, the recommendations of the committee were adopted as the sense of the Association.

Mr. Moon submitted draft of a bill providing for the creation of a Division of Pomology, which was read and, on motion of Mr. Snively, referred to Committee on Legislation.

After brief consultation, Committee on Legislation reported favorably on the proposed bill and its adoption was recommended by the Association.

CROWN GALL OF FRUIT TREES.

This was to have been the subject of a paper by Prof. Butz, of State College, but owing to his unavoidable absence, the paper was omitted.

In reply to an inquiry, Prof. Craig stated that there is apparently no remedy for this disease and that trees thus affected had better be destroyed.

In reply to another inquiry, Prof. Craig gave as his opinion that the disease could be transmitted from one variety of tree to another. He stated also that black knot of cherry and plum are identical.

QUESTIONS FOR DISCUSSION.

34. "Have sulphate of copper, or of iron or Bordeaux mixture been used in the soil to any extent as a preventive or cure for yellows?"

Prof. Craig.—Yes; this question has been thoroughly gone over in a series of experiments and there is evidence that such application is a preventive or cure.

Prof. Johnson.—Don't know that I can add anything to what Prof. Craig has said further than to endorse his opinion. It seems to have been proven by experiments that condition of soil has nothing to do with yellows. The cause is not known and seems as mysterious as ever. The only remedy or cure is to dig up and destroy.

24. "Shall Pennsylvania fruits be represented at the Pan-American Exposition at Buffalo in 1901?"

Prof. Hamilton.—I have been in correspondence with the authorities in reference to this matter, and have suggested that there be some legislation to this end. I think our fruit industries should be represented at Buffalo.

Mr. Chase.—New York is already in the field, putting fruit into cold storage to be ready for the opening of the exposition. Later exhibits will be made during the season as fruits come in. Of course it is too late for Pennsylvania to put fruit in storage but a creditable display of apples could yet be made if prompt action were taken. Other States have made liberal appropriations for such display and our State ought to do likewise.

HON. THOS. EDGE ELECTED HONORARY MEMBER.

Mr. W. H. Moon.—Mr. President, if in order, I desire to present

for honorary membership in this Association the name of one who has been well and favorably known to the farmers and horticulturists of this State for twenty-seven years. I nominate the ex-Secretary of Agriculture, Thos. J. Edge.

Mr. Cooper.—I desire most heartily to second this nomination. There is no name in the State that more deserves the honor of election to membership.

Mr. Edge was elected unanimously by rising vote.

Mr. Edge briefly thanked the society for the honor.

QUESTION BOX.

1. "Could the keeping qualities of the Northern Spy be prolonged by grafting it on the wood of some long-keeping variety?"

Mr. Hiester.—I would say, no.

2. "Is *Eleagnus longipes* of practical value as a commercial fruit?"

W. H. Moon.—No, none but for ornament.

S. C. Moon.—I have had some experience with it and claim it is more valuable than the currant bush. It has a small berry, of pleasant taste, one seed and will make a jelly superior to the currant. It has, in some sections, been received as a remarkable acquisition, and I believe it quite valuable for family use. I am surprised that it is not more generally known.

W. H. Moon.—While a highly ornamental shrub, I cannot recommend it. It is subject to insects and diseases.

3. "What is the best size package for peaches, pears and apples?"

Mr. Hiester.—This question was submitted by myself. I ordered some twenty-pound handle baskets the past season and when they came they held only eighteen pounds. They were objected to in some localities, and I was told to put fruit into other baskets. I have some on hand which I fear I cannot use.

Mr. Wertz.—I used quite a number last year. I wrote to different manufacturers and was told that they were reduced in size to conform to State laws.

REPORT OF COMMITTEE ON EXHIBITS.

Mr. Hiester, Chairman of Committee on Exhibits, submitted the following:

Your committee would respectfully report that while there was quite a large collection of apples from various parts of the State, owing to the unfavorable season, the fruit in size, quality and general appearance fell far below the standard of Pennsylvania fruit as usually shown at meetings of this Society. The display, however, furnished an excellent object lesson to the members, as they were able to compare the several varieties of winter apples and note the

effect of unfavorable weather upon their ripening and keeping qualities.

The only really fine specimens in the collection that showed full size, clear skin and perfect color were York Imperial, Ben Davis, York Stripe and Smith's Cider, closely followed by one plate of Rome Beauty. All other varieties showed evident signs of the hard struggle they had to prolong their existence to this time.

This fact goes far to prove the wisdom of this Association in strongly recommending the above named varieties for general planting in Pennsylvania.

By careful inquiry we also find that the clear-skinned, high-colored specimens were all grown on trees that had been carefully sprayed, and a few plates that were badly discolored by fungus and showed injury by codling moth were brought by men who don't spray their trees, and these blenished specimens placed alongside the clean, high-colored ones showed more forcibly than words of any speaker can do the importance of careful systematic spraying.

Your committee wishes to make special mention of one plate of York Imperial shown by Calvin D. Scholl, one plate of York Imperial and one plate of York Stripe by D. C. Rupp, one plate each of York Imperial, Ben Davis and York Stripe by Noah Sheely, and one plate of Salome by E. E. Persing. These apples were all of large size and high color, of very attractive appearance, and gave evidence of the intelligent care that had been bestowed on the trees by their owners.

Mr. J. Horace McFarland made a beautiful display of Florida citrus fruits, brought into the room with the fruits adhering to the branches in clusters just as they had grown on the trees. This proved an object of great interest to the members, very few of whom had ever seen oranges growing on the trees. The varieties shown were oranges: Jaffa, Bessie, Parsons, Satsuma, Tangarine (2), Tardiff and Washington Navel. There were two specimens of Genoa lemon, and a large cluster of the grape fruit, or pomelo, showing ten perfect specimens.

Mr. J. D. Brenneman showed ten pots of Mrs. Southy gerraniums, which were remarkably thrifty and uniform, both in foliage and bloom.

Messrs. Rakestraw and Pyle presented a vase of choice carnations, but failed to place a name card on them.

Mr. Foster, representative of the "Rural New Yorker," presented a vase of beautiful carnations and mignonette.

Mr. Daniel Smeych showed Burn Easter, Joseph d'Malines and Lawrence pears, which were well grown, smooth and in remarkably good condition for this season of the year. The following is a list of the fruit on exhibition:

J. V. Garretson & Son, 8 plates: Ridge Pippin, Winter Paradise, Lancaster Greening, Baldwin, York Imperial, Smith's Cider, Wine sap and Fallawater.

Daniel Smeych, 6 plate of apples: Pippin, Lancaster Seedling, Pound, York Imperial, Gilliflower, Northern Spy.

A. W. Root, 2 plates for name, which your committee believe to be chance seedlings.

Joel A. Herr, 7 plates: Wintergreen, Mann, Smith's Cider (2), York Stripe (2), Ben Davis.

T. A. Wood, 1 plate: Dominie.

Noah Sheely, 3 plates: York Imperial, Ben Davis and York Stripe.

W. H. Stout, 7 plates: York Imperial, Winesap, Pennock, Rawl's Janet, Paradise, Lancaster Greening and Willow Twig.

Calvin School, 3 plates: York Imperial, Seek No Farther and Rome Beauty.

D. C. Rupp, 6 plates: York Stripe, Ben Davis, Great Bearer, York Imperial, Smith's Cider and Strinestown Pippin.

E. E. Persing, 3 plates: Priestly, Lankford and Salome.

Rakestraw & Pyle, 11 plates: Ridge Pippin, Mann, Ben Davis, Mammoth Black Twig, Lankford, Lawver, Red Romanite, Shockley, Brandywine, York Stripe, Smith's Cider.

David Miller, 1 seedling apple.

J. L. Rife, 1 plate: York Imperial.

This collection, while not doing full justice to many varieties on exhibition, owing to the unfavorable season, afforded the members of the Association a chance to see, handle and taste the different varieties and judge them by comparison, and they took advantage of the opportunity, surrounding the tables during the intervals between meetings and fully discussing the merits and demerits of the different kinds, and we would suggest from what we noticed in connection with this display that an exhibition of all the fruits grown in this State, whether good or bad, can be made of more practical value to the members of the Association than any other part of the meeting.

Respectfully submitted,

GABRIEL HIESTER,

JACOB L. RIFE,

J. E. JAMISON,

Committee.

THE SAN JOSE SCALE.

In response to a request from the Society, Prof. Johnson, of Maryland, spoke briefly of the San José Scale in that State, and of the practical working of the law enacted for its suppression.

After two years experience with our law we find some things in it we would want to change. General inspection of nurseries is a good feature, and while several inspections should be made annually, no certificate should be granted for inspection made before August first. While our law requires semi-annual inspection, we go six times in the interval, if necessary. We should have also well-defined authority to enter property where trees are infested. In many cases it is not necessary to destroy trees. If they can be saved by a system of treatment it is preferable. This has been our policy and would advise you to consider that carefully. I could cite instances where nurserymen have been driven out of business by carelessness of neighbors.

Another important point is fumigation. As yet I do not think it necessary to make it compulsory, but it should be left to the option of the proper authority to decide, and officers in charge should have full control of fumigation and authority to condemn. There should also be authority to quarantine and hold infested trees in transit. We had no organization in 1896. We organized and presented our request to the Legislature and succeeded in getting a law passed and a liberal appropriation for its enforcement.

S. C. Moon.—Is San José Scale increasing or diminishing in Maryland?

Prof. Johnson.—The Scale is decreasing in the State, but the localities where it is found are increasing.

On motion, adjourned.

Tuesday, January 22, 7.30 P. M.

The closing session was devoted to lectures by Prof. John Craig, of Cornell University, subject: "Decorating the Home," and Prof. W. G. Johnson, associate editor *American Agriculturist*, who gave his "Experiences in the Most Remarkable Peach Orchards in America."

Both lectures were illustrated by views from the stereopticon, and were specially interesting by being true to nature. At the outset Prof. Craig disclaimed any intention of doing much talking, as he proposed to let the pictures do the talking. His purpose was to show that homes can be made attractive and beautiful by utilizing natural scenery and the products of nature. He claimed that the nearer we can imitate nature, the nearer we become the true artist. The views used to illustrate his lecture covered a wide range of subjects. They included illustrations of rural homes and grounds, shrubby hedges, rockwood, screens, bridges and forest trees. Views were given also of noted English estates and gardens, and

several Italian gardens and Alpine scenes. The illustrations embraced a great variety of subjects and well sustained his claim that nature herself furnished the best means of decorating the home.

No less interesting, but in a somewhat different line, were the lecture and views given by Prof. Johnson.

The illustrations included scenes from actual life, taken in the orchards of J. H. Hale, in Georgia, West Virginia, Maryland and Connecticut, including buildings, packing stations, employes and manner of assorting, loading and shipping the products.

Prof. Johnson called attention to the perfect order and system which prevailed in the orchards of Mr. Hale and others, to which he attributed the success which has been attained in their management.

On motion of Mr. Edge, a vote of thanks was tendered Professors Craig and Johnson for their entertaining lectures.

On motion, adjourned.

PENNSYLVANIA DAIRY UNION.

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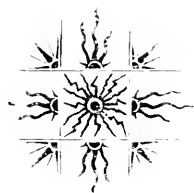
Fourth Annual Meeting

OF THE

PENNSYLVANIA DAIRY UNION,

HELD AT

YORK, PA., DECEMBER 4 AND 5, 1901.



FOURTH ANNUAL MEETING OF THE PENNSYLVANIA DAIRY UNION, HELD AT YORK, PENNSYLVANIA, DECEMBER 4 AND 5, 1901.

FIRST DAY—Morning Session.

York, Pa., December 4, 1901.

Preceding the formal opening of the meeting, Professor Hayward made the following statement:

I need hardly say that the object of the Pennsylvania Dairy Union is to stimulate and interest the farmers of Pennsylvania in the dairy industry. Our efforts in the past four years have been along this line. We framed and had passed the oleomargarine bill, and we are working along lines which will be of interest and benefit to the dairy-men. We have not done all we hope to do, but we have done something. Our meeting to-day is for the purpose of securing mutual ideas regarding what we ought, and can do to help along the standard of dairying products.

The annual dues of the Union are one dollar, and we hold one meeting each year. We try to get the best authorities in the country to come to us and present their experience and practice to us first hand. The cost of holding this meeting will be about \$400, and I hope that those of you who are not already members and who are interested in dairying will contribute your influence and money.

The meeting was then called to order by the President, Joseph C. Sharpless, of Londongrove.

ADDRESS OF WELCOME.

The address of welcome was delivered by Mr. D. P. Forney, of Hanover, as follows:

Mr. Chairman, and Gentlemen of the Union: In obedience to the great law of co-operation and organization which seems to prevail just now in every department of human industry, the dairymen of Pennsylvania have banded themselves together for furthering their own interests. They have come into the county of York for the purpose of holding a meeting and doing what is possible for the furtherance of the dairy interests here as well as elsewhere in the State.

For this reason, those of us who live in this county welcome you most earnestly with that hearty German welcome which is so common in the German counties of Pennsylvania. We feel that your coming is a compliment to the people of York county, and that should the people fail to come here and make use of this opportunity it is nothing short of a disgrace to the farmers of this county.

York county, as you know, stands high as an agricultural county; and ranks among the highest, not only in Pennsylvania, but in the United States. Perhaps the best indication of the condition of its agriculture lies in the fact that it stands second in the consumption of fertilizers. The farmers of York have become preeminently grain farmers, and for this reason the dairying interest has fallen behind. Wheat farming has been the substratum of agricultural success in our county. Out of the money made from the wheat crop, many a mortgage has been paid and the farm cleared of debt. It has been a common thing for the farmer to pay one-third of the value of his farm in cash, and the rest out of the wheat crop. The dairy interests have been subsidiary, offering to the farmer's wife spending money and provision for the accessories of the farm. This has been more particularly for the reason that the "Pennsylvania Dutchman," whatever his virtues may be, has a terrible aversion to milking a cow. He looks upon it as a disgrace to his manhood, and all the milking done in this section of Pennsylvania for many years was done by the female portion of the family. In fact, the Pennsylvania German has been accused of not taking that serious interest in the welfare of the women of the family that he takes in the welfare of his own well fed stock. Thaddens Stevens said that Pennsylvania was notable for fat horses and thin women. There is an old German proverb which indicates that it is perhaps an easier matter to replace a dead wife than to replace dead cattle. This is an experience probably shared quite frequently by other people who are not Pennsylvania Germans. For these reasons we feel like giving to you, the Dairy Union, a double welcome in York county. The dairy interests in this county need you, and whatever you may see fit to communicate to the dairymen, you may be sure will be like seed sown on good ground, which will spring up in due time and bring forth fruit.

It was a happy thought on the part of those who founded this association, to call it a "Union." In looking over a long list of associations of this kind, I fail to find a single one, but this, which is called a Union. A union implies, not merely an association, but a sort of vital connection. Those of us whose remembrances go back to the Civil War look upon that word "Union" almost with reverence. The definition of that word has cost more blood than any word in human history ever cost any nation, and to-day we look upon it as a sacred word in all the creed of American independence. Therefore,

when we come together as a "Union" we come together with a vital connection, which means that every one of us stands for the welfare of every other member of this association and that our life work will be in that direction.

It is this great theory which underlies all progress in human affairs. The power of the world lies in organisms, and the success of the world's progress lies in organizations. Life is one grand panorama in illustration of this great fact; from the microbe which lies at the very bottom of matter, scarcely knowing whether it lives or dies, up to man himself, creation's crowning glory, the organism made up of a million of parts with an intellect shining from underneath his brow like a spark struck from the burning essence of its God. Groping, as we all must, in our weakness, in the dark mysteries of our little lives, we shall finally enter into the Divine wisdom which shall come to us in the after world.

Having entered upon this association, it seems to me that as dairy-men it would be well to take a more comprehensive view of its progress of ideas. Ideas, Napoleon says, are like an army; if you do not keep up to them, they will march over you. This is the spirit which is leading onward everywhere to-day. The imagination in seeing what may be in reserve for future generations grows almost wild in delirium in contemplating the development of co-operation which prevails everywhere. One century of American experience in organism, on which this nation was founded, has been enough to prove to this generation and to the world that individual competition is a failure. Out of that century of experience has grown that magnificent law which we must all now acknowledge, that competition is the law of death and cooperation the law of life. When we reflect that the learning of this lesson has cost this American people but one single century of experience, we realize that it is a little price to pay compared with what the world's nations have paid for lessons they have often learned; and we have reason to be thankful to that Almighty Teacher of the universe who has given this lesson in so short a time; especially, when we remember that out of His hand the ages fall like grains of sand.

We are standing now upon the threshold of a century which marks the coming of the kingdom of cooperation among men. Around the co-operative idea I believe will, in the future, crystallize forces whose acute angles will cut through all this world's time-hardened philosophy, and leave a fracture, so bright and clear, that even the lowliest of men may look up and see through it, God's own eternal truth. Yet a little while, and men will begin to see around them on every hand the warm glare of that bright light of the after world, which must fall as warmly on the humble cot of the lowliest worker as it ever fell on kingly palaces. In the upward movement of those mighty

forces which we are helping onward by cooperation, the drudgery of the land workers must soon disappear, in illustration of that Divine harmony which first prevailed when "the stars of the morning sang together." The men of the future, standing as close to the end of this century as we have stood to the past, may begin to see on every hand the fading away of the thistle and thorn, and in their place will rise again in sublime grandeur the tree of life, out of whose trembling leaves has come the healing of the nations; with its fruits as tempting as in the days of Eve, all fashioned and tinted by a diviner hand than earthly artist ever had, and the voice of Jehovah be heard once more saying, this time shall you take and eat, for now you are as God and you shall live forever.

The President, Joseph C. Sharpless, then responded as follows to the Address of Welcome:

RESPONSE TO THE ADDRESS OF WELCOME.

On behalf of the Dairy Union here assembled, it gives me great pleasure to respond to the able address of welcome to which we have just listened. I with several of my neighbors, but not so many as I had hoped, have come to York to give our whole attention to whatever may come before us for consideration; and I am sure that I voice the sentiment of all, when I say that there was a feeling of cordiality permeating the atmosphere that went to the very soul the moment we entered your energetic town.

This is the fourth annual meeting of this organization, and I can think of no better place to meet than your county seat. Situated as it is in one of the grandest dairy sections in this State, it is to be hoped that before we adjourn we may reap fruit by way of a larger membership; for you who are not members should feel it your duty to become such, as it is a question whether we shall continue or give up in despair. Can we not run a dairy organization in this State, which has been one of the most progressive in the Union? In answer we must do it or hang our heads in shame. Again, shall we let some of our younger dairy States of the west surpass us in the producing and making of dairy products? Their secret of success, I have no doubt, is the result of organizations, for the old adage "in union there is strength" is a true one and one we must follow. These States spend their hundreds of dollars to make their business a success; spend it at our expense in the end. You know that 30 or 40 years ago the best butter that went into Philadelphia market came from Bradford county, together with a few special brands from Chester county, such as the Darlington and Sharpless brands, which at that time could demand \$1.00 per pound.

But now, how is it? We have let those States with their tact, in-

dustry and education, received through their dairy schools and proper legislation, produce an article just as good as ours and put it into our market as cheap if not cheaper than we can put it there under our present arrangement. This should impress us with the fact that something is needed on our part. We need organization of this kind where we can come together and discuss the advisability of new methods or the fulfilment of present methods. For my part I think we need better legislation along these lines. First, the farmers and dairymen themselves must consider well this important question of what is needed to make dairying a success. Then perhaps they will see the advisability of appropriating a sum of money to build and maintain a dairy school at our State College. The resolution introduced at our local institutes last year for such an appropriation was adopted by a very flattering majority. But when the Legislature did finally pass the appropriation bill, the Governor saw fit to veto it. If he could have seen it in the proper light, perhaps the result would have been otherwise. This proves to us how important it is to see that the right kind of men are sent to our next legislature, those who will not put too much money into such things as monuments, but put it to more urgent demands. For instance, money could be given for butter inspection, in order to prevent the reprinting of butter to suit the occasion. Some of our dishonest dealers, if I may be permitted to call them, will imitate any fancy print that may be desired.

In Philadelphia market we have a brand of butter of good reputation, made in Lancaster county, and in order to sell packed goods a dealer will print it up without any compunction of conscience in exact imitation of the above mentioned brand; why I really found an exact imitated one-half pound print of my own butter, which was nothing more than "oleo." Such proceedings are not the exception either.

When we find the western solid packed butter printed up into such forms as E. D. B. B. and S. S., certainly there must be some legislation enacted along this line. As Governor Hoard says in a late issue of his valuable paper, that the farmers of Pennsylvania have been too indifferent to their dairy education; they have not kept an active dairy association in their midst to vitalize and stimulate thought and practice on this subject. They could not see that it was worth considerable sacrifice on their part to support such an association, and so they let their old association die out.

This new one was organized largely by the efforts of Prof. Hayward, our present secretary. Surely every dairyman of this State should have made it a point to be here. Every creamery and cheese factory should at least have selected a delegate to represent them

to fight two of the cow's worst enemies—oleomargarine and sluggish indifference among the dairy farmers—one is as bad as the other. The first lives only because of the latter.

Along this line I see one thing on the programme to be discussed, and that is "the working of the oleo law in this State." We all know what a political stir this question raised in our land a year ago, but we hope it is out of politics now, and is in shape to do good work. I hope we may be able to assist in holding up the hands of our officials wherever opportunity offers. This law will be evaded in every possible way this winter on account of the higher price of butter, and it will require eternal vigilance to keep unscrupulous dealers from selling oleo against the law.

Another question confronting us this year, and I believe is to be discussed, is the high price of feeding stuffs, and how to feed it to the cow so she will pay for the same, and leave enough to pay her owner for his trouble. No doubt we shall reap enough from this one article to repay us for our time spent in coming here. Given as it is from one of our best authorities on the subject, one who has done much for the farmers of his State.

There are so many questions of interest on the programme that I fail to see the reason why people hesitate or object to coming here and be present with us.

Some of my neighbors when I wanted them to come and attend this meeting said: "Oh, such things do not amount to much, so what is the use in going." Such as these need to be educated. If everybody would by paying the small sum of \$1.00 become members, what a power we could be! Instead of 26 or 27 cent butter it would be 35 or 40 cent butter.

Again permit me to say that we are glad we have come to accept your hospitality, and we can see no excuse why these gatherings will not be the instruments of success. Anyway we shall, no doubt, be the better for rubbing elbows with one another for a couple of days.

The following paper was then read:

PROTEIN.

CAN DAIRYMEN PRODUCE THE NECESSARY PROTEIN FEEDS PROFITABLY ON THEIR OWN FARMS?

BY H. J. PATTERSON, *Director Maryland Experiment Station.*

There is no question which is of so much importance to the dairy farmer as the proper feeding of his cows so as to obtain not only the greatest amount of product, but also to procure that product at the least cost per pound. The progressive dairyman has come to recognize that protein is a necessary constituent to accomplish this end. At first it seemed a simple matter to turn to the markets and purchase the protein which the home grown feeds did not furnish. But even under the most favorable conditions of purchasing protein the amount paid out for feed represents a large percentage of the gross income which must materially cut down the profits. In this day when the demand for this class of feeds has largely increased both for foreign and home consumption and the price of our products relatively less, it has become a very important and lively subject to consider how the amount of protein required can be produced on each and every farm. Not only is it necessary to find out the crops that can be grown so as to furnish the required protein; but it is also essential to determine the crops which will furnish this protein profitably and most economically. The question of the home production of protein is much more important for the eastern dairyman than for his western brother, from the fact that protein feeds are much cheaper in the west than the east which, together with the fact of its always being cheaper to market a finished product rather than the raw materials, places the already keen competition between the eastern and western dairy products still more to the advantage of the west. This fact is also true as to the production of all classes of animal products.

There is no doubt that the Home Production of Protein is the pertinent question of the day for the eastern dairyman and stockman. How to answer this question and solve the various problems connected therewith are more or less difficult and will require each person or community to make some individual calculations and modifications of anything that might be said in this connection, yet it may

be possible to make some suggestions at this time that will aid or point the way in making a satisfactory solution of the present difficulties.

For an intelligent consideration of this question turn to the figures given in Table I and study the various crops which are commonly raised on the farm, and see how much protein is being produced and then turn to those crops which are not commonly grown, but which may be adopted on the farm in question and calculate how it would be best to proceed to produce that which is required.

By observing the nutritive ratios in the two parts of Table I, it will be seen that those in Part 1, with the exception of the ratio for clover, hay and oats, are wider than the requirements of a standard dairy ration, and also that it would be impossible to make a combination of the crops in Part 1 so as to furnish the required relation of the Protein and Carbohydrates. The crops in Part 2 have relatively narrow ratios, and can be used for making balanced rations as is manifested by a study of the illustrations given in Tables II and V.

There are numerous other crops that might be included in the estimates and combinations which are not given in Tables I and II, but these will serve to point the way. For instance those sections which are further north, and not well adapted to cow peas, might substitute the Canada pea. In this connection, be it remembered, that cow peas are really beans and belong properly to the bean family, and are hot weather crops. For best results they should not be planted until the ground is thoroughly warm (after June 1) and they will be killed off with the first frost of the fall. The Canada pea is a cool weather plant and can be planted very early in the spring, like oats and barley, but it is impatient of hot, dry weather and hence not adapted to the south.

Often considerably more forage can be grown to the acre by combining some of the legumes with a cereal, for example, Canada peas and oats; Canada peas and barley; winter oats or barley and winter vetch; Winter vetch and wheat; cow peas and sorghum; cow peas and corn; cow peas, corn and millet. All of these combinations have been used in different sections with excellent results.

In Table II are given some sample rotations which might be suggestive as to ways in which rotations common to parts of this State might be modified so as to better meet the requirements of dairy farms. Rotation "A" is one that is used in part at our Station quite satisfactorily, and our experiments indicate it could be used as a whole. This rotation to some is objectionable as it requires frequent plowing and thus incurs considerable expense for labor. Supplementing the rotations as shown in "B," "C" and "D," Table II, with alfalfa, it will be seen is a very effective means of furnishing the required protein and does not necessitate any more plowing than at

present. These schemes would make it necessary to put from one-fifth to one-seventh of the land devoted to crops for feeding the dairy down to alfalfa. Alfalfa, when once established, will stand for 6 to 10 years. Results of tests thus far seem to indicate that alfalfa can be successfully grown in most parts of this State, and that during August or the first of September is the proper time for seeding. From the digestion and feeding experiments which have been conducted it has been found that the protein of alfalfa hay can be used as a substitute for wheat bran and cow peas will answer nearly as well as the alfalfa.

It will be noted that the rotations as given in Table II will furnish enough feed of a balanced character, according to the western standard, to maintain a cow on from one and one-half to two acres. The yields outlined herewith in Tables I and II are only such as would be considered fair and satisfactory. Many farmers are producing much more. The ideal in dairying of maintaining a cow on one acre means that this must be done to a large extent by increasing the yields and using the combinations which have been suggested. The value of the leguminous crops as gatherers of nitrogen and miners of subsoil fertility must not be overlooked in the matter of the economical procuring of protein and is an additional argument for introducing these crops in the farm rotations.

COST OF PRODUCING vs. BUYING OF PROTEIN.

From the discussion in the preceding pages, and the figures to be noted elsewhere, it is very evident that the necessary protein can be procured on the farm; but this is only one phase of the question and still leaves the question of the cost of production for consideration.

An examination of Tables I and III will show that one acre of cow peas will produce a little more digestible protein than is furnished by two tons of wheat bran, which would make the product of one acre of cow pea hay worth on the basis of the present (December 1st, 1901) market value of bran, \$44.00 or \$17.60 per ton. The cost of producing one acre of cow peas would vary from \$10.00 to \$15.00.

One acre in alfalfa would yield the equivalent \$73.00 worth of protein if purchased in wheat bran; or in other words a six-acre field of alfalfa would yield as much digestible protein as is purchased in a 20 ton carload of wheat bran. Of course protein can be purchased cheaper in cottonseed meal, linseed meal and gluten meal than in wheat bran, but even with these proteins can be produced by alfalfa or cow peas at about one-half their cost.

These figures together with the fact of the leguminous crops being soil improvers and that they can be grown often as catch crops between the regular crops, leave but little doubt as to the wisdom and profit of the home production of protein. It may be that some of

these most promising crops are not adapted to individual conditions; yet there are some crops rich in protein adapted to each and every condition and the margin of profit is large enough to warrant all in searching for the crops that can be grown and then producing the required protein at home.

PROTEIN IN PASTURES.

Much might be contributed towards feeding dairy cattle by the improvement of the permanent pastures. Almost every farm has a small area that would be more profitable for a permanent pasture than for cultivated crops. On such areas it would pay well for the trouble and expenses if they were well prepared and set to crops adapted for pasture purposes. There are numerous grasses and some legumes that are specially adapted for pasture purposes and which are of little value for hay purposes. The grasses specially adapted for pastures will stand the tramping and cropping to which they are subjected which as every one knows how soon a clover and timothy sod gives out under such treatment.

Among the grasses best adapted for pasture purposes in most of this State might be mentioned the following: Kentucky blue grass, Rhode Island bent, Red top and Orchard grass. These should be supplemented at time of seeding with a liberal amount of white clover and some alsike and red clover. In some sections the Japan clover will be found to do well and is a valuable addition. The Japan clover is an annual which will seed itself from year to year.

WHAT FEEDS ON THE MARKET ARE THE BEST SOURCES OF PROTEIN.

Some farmers may be so located that it will be necessary to supplement the home grown feeds. In such cases the question arises, "What shall be purchased?" On most farms there is generally an abundance of the feeds rich in carbohydrates, and it is desired to buy those which can be used to best advantage in balancing the dairy ration. Under such circumstances it will generally be found that to purchase the most concentrated protein food compatible with price is best.

The figures given in Table III show that at the present market conditions, protein can be procured cheapest in cottonseed meal. The next source is gluten meal and the most expensive source is the one most commonly depended upon by farmers, namely, wheat bran.

Table III will serve to make calculations when market conditions change. Very often farmers desire to purchase protein feeds in quantity, yet do not care for more than one kind, and desire something that can be used for all classes of stock. In such cases cottonseed meal would not be advisable, as it could not be used for hogs, chickens or horses.

INCREASING THE SUPPLY OF PROTEIN BY PLANT BREEDING.

The most recent experiments in plant improvement by breeding and selection indicates that a great deal can be done towards increasing the supply of protein by increasing the percentage of protein in the crops raised on the farm. It is well known that special qualities in animals have been produced by selection and breeding. Plants are not unlike animals in this respect, and if the same laws are observed the future will find distinct breeds or types of our various crops possessing special characteristics as to the relative amounts of the valuable constituents.

What may be accomplished by plant breeding is well illustrated by the improvements made in the sugar content of the sugar beet, sorghum and sugar cane. In Table IV is exhibited what might be expected as the ultimate outcome of plant improvement by selecting and breeding, if the highest types of which there is knowledge were to be used as a basis. From this table it will be seen that there are great possibilities even with those crops which have been commonly raised on the farms of this State for years. From present indications the corn plant presents not only the easiest subjects for improvement, but also seems to possess the greatest possibilities.

It must be remembered that when the protein content of the crops is increased, the carbohydrates are diminished proportionately; consequently the nutritive ration is narrowed and with the full realization of the facts as set forth in Table IV there would be no difficulty in balancing a ration with the ordinary products of the farm. It is essential that every farmer who expects to keep pace with the times and be able to cope with the competition of the future should start at once upon the improvement of the breed of his crops, especially of the corn crop, with more protein for the goal.

There has been 50 samples of corn submitted to Maryland Station for analysis by farmers who are taking up the question of breeding up the corn crop. These samples showed a range of from 8 to 12.5 per cent. of protein, which with a 10 barrel crop would be equivalent to a range of 157 pounds of protein per acre. Crops can not be improved at one place for all, but will have to be done in different sections, so as to have the crop adapted to the various climatic and soil conditions.

Improvement of the crop will necessitate the improvement of the soil, and in fact a rich soil will have much influence in bringing up the protein content of the crop, and this will be another reason for availing of the value of the leguminous crops as agents for soil improvement.

SAMPLE RATIONS.

In Table V are given some sample rations which serve to show how such leguminous crops, as alfalfa and cow peas, can be used in

making balanced rations, and they illustrate their advantage over the common crops of the farm which an examination of the table shows are deficient in protein and need to be supplemented by some of the rich by-products.

In furnishing an abundance of protein feeds the farmer has accomplished much in the way of improving the yield of animal products, but must not rest easy or think that this is all-sufficient, but remember that there is much truth in the adage "The eye of the master fattens his cattle."

TABLE I.—YIELD OF PROTEIN BY AVAILABLE FARM CROPS.

		Yield Per Acre.				
Fair Acreage Yield.		Per cent. protein.	Total protein—Lbs.	Digestible protein—Lbs.	Digestible carbohydrates (fat x 2½)—Lbs.	Nutritive ratio.
PART 1. Crops Commonly Raised.						
Corn (grain and cob),	10 barrels, 3,500 pounds, 3,600 pounds,	8.5 3.8	298 114	167 64	1,505 1,152	1:15.0 1:18.0
				231	2,657	
Barley (grain),	40 bushels, 1,600 pounds, 3,600 pounds,	12.4 3.5	228 105	193 42	1,544 1,377	1: 8.0 1:32.8
				235	2,921	
Oats (grain),	50 bushels, 1,600 pounds, 2,500 pounds,	11.8 4.0	189 109	155 40	899 1,320	1: 5.8 1:23.0
				195	2,219	
Wheat (grain),	25 bushels, 1,500 pounds, 2,700 pounds,	11.8 3.4	177 82	136 33	1,346 2,161	1: 9.9 1:65.5
				169	3,567	
Timothy hay,	2 tons,	5.9	236	111	1,798	1:16.2
Orchard grass hay,	2 tons,	8.1	324	193	1,814	1: 9.4
Red clover hay,	2 tons,	12.3	492	285	1,710	1: 6.0
PART 2. Crops not Commonly Raised in This Section.						
Cow peas (green),	16 tons,					
Cow peas (hay),	2½ tons,	16.6	820	538	2,658	1: 3.8
Cow peas (grain),	20 bushels, 1,200 pounds,	29.8	250	297	679	1:33
Soy beans (green)	8 tons,					
Soy beans (hay),	2½ tons,	14.5	725	513	2,311	.....
Soy beans (grain),	25 bushels, 1,700 pounds,	31.0	510	465	805	1: 1.7
Alfalfa hay,	1 ton,	14.3	1,114	724	3,378	1: 4.1

TABLE 2. PROTEIN YIELDS OF SAMPLE ROTATIONS.

(One Acre in Each Crop.)

Rotation A.	Digestible protein—Lbs.	Digestible carbohydrate and fat—Lbs.	Rotation B.	Digestible protein—Lbs.	Digestible carbohydrate and fat—Lbs.
1. Corn and fodder,	231	2,657	1. Corn,	231	2,657
2. {C. clover hay,	285	1,710	2. Wheat,	136	1,348
{C. pea hay,	538	2,958	3. {Clover and	285	1,710
3. Winter barley,	235	2,221	4. {Timothy,	111	1,798
4. R. clover hay,	285	1,710			
Total rotation,	1,574	11,056	Nutritive ratio, 1:9.8.	763	7,511
			Supplemented by alfalfa, ...	824	3,378
Nutritive ratio of ration,		1:7.0		1,587	10,889
			Nutritive ratio,		1:6.86

This would give enough feed to keep two cows for one year, feeding them on the basis of two pounds of protein per day each, which would be the equivalent of one cow to each two acres.

Rotation C.	Digestible protein—Lbs.	Digestible carbohydrate and fat—Lbs.	Rotation D.	Digestible protein—Lbs.	Digestible carbohydrate and fat—Lbs.
1. Corn,	231	2,657	1. Corn,	231	2,657
2. Oats,	195	2,219	2. { $\frac{1}{2}$ oats,	97	1,110
3. Wheat (sold),			{ $\frac{1}{2}$ C. pea hay,	269	1,629
4. {Clover and	285	1,710	3. Wheat (sold),		
5. {Timothy,	111	1,798	4. {Clover and	285	1,710
			5. {Timothy,	111	1,798
Nutritive ratio, 1:10.2.	822	8,384	Supplemented by alfalfa, ...	824	3,378
Alfalfa,	824	3,378		1,817	11,682
	1,646	11,762	Nutritive ratio,		1:6.4
Nutritive ratio,		1:7.1			

TABLE 3.—PRINCIPAL PROTEIN FEEDS ON OUR MARKETS.

	Cost by carload in Baltimore, December 1, 1901.	Per cent. protein.	Total protein—Lbs.	Digestible protein—Lbs.	Digestible carbohydrate (fat x $\frac{2}{4}$)—Lbs.	Nutritive ratio.	Cost per pound of protein furnished—Cents.
Cottonseed meal,	\$26.00	42	810	761	874	1:1.2	3.4
Linseed meal (new process),	28.00	35	780	663	898	1:1.6	4.2
Linseed meal (old process),	30.00	36	720	640	970	1:1.7	4.7
Gluten meal,	25.00	38	760	669	1,450	1:1.9	3.7
Gluten feed,	23.00	23	500	420	1,266	1:6.4	5.3
Malt sprouts,	18.00	24	480	384	806	1:2.2	4.7
Brewers' grains,	19.00	24	480	379	942	1:2.3	5.0
Buckwheat middlings,	23.00	28	560	460	1,010	1:2.2	5.0
Wheat bran,	22.00	16	320	250	908	1:3.8	8.0
Wheat middlings,	23.00	16	320	260	1,220	1:4.8	8.1

TABLE 4.—SHOWING MEANS OF INCREASING YIELD OF PROTEIN BY CROP IMPROVEMENT.

(Average Yield Per Acre.)

	Per cent. of protein.	Total protein per acre—Lbs.	Digestible protein per acre—Lbs.
50 bushels corn, average protein,	8.5	298	167
50 bushels corn, high in protein,	14.0	490	274
50 bushels oats, average protein,	11.8	189	133
50 bushels oats, high in protein,	14.4	230	129
40 bushels barley, average protein,	12.4	238	193
40 bushels barley, high in protein,	15.7	301	244
25 bushels wheat, average protein,	11.8	177	136
25 bushels wheat, high in protein,	16.6	249	192
2 tons clover hay, average protein,	12.3	492	285
2 tons clover hay, high in protein,	20.5	820	475
2½ tons cow peas, average protein,	16.6	820	538
2½ tons cow peas, high in protein,	20.0	1,000	650
4 tons alfalfa, average protein,	14.3	1,144	824
4 tons alfalfa, high in protein,	20.3	1,624	1,169

TABLE 5.—DAIRY FEEDING STANDARDS AND SOME SAMPLE RATIONS.

Quantity.		Protein—Lbs.	Carbohydrates—Lbs.	Nutritive ratio.
German standard ration,		2.5	13.4	1:5.4
Wisconsin estimated ration,		2.2	14.9	1:6.8
May and June pasture grass,				1:5.6
Corn and cob meal,	10 pounds, .....	.44	6.65	
Alfalfa hay,	15 pounds,	1.65	6.34	
		2.09	12.99	1:6.2
Corn meal,	10 pounds, .....	.53	5.91	
Clover hay,	15 pounds,	1.02	5.94	
		1.55	11.85	1:7.6
Cream gluten meal,	2 pounds, .....	.64	1.45	
		2.19	13.30	1:6.0
Corn meal,	10 pounds, .....	.53	5.91	
Cow pea hay,	15 pounds,	1.40	5.76	
		1.93	11.67	1:6.0
Corn and cob meal,	12 pounds, .....	.53	7.98	
Cow pea hay,	15 pounds,	1.40	5.76	
		1.93	13.74	1:6.6
Corn silage,	30 pounds, .....	.27	3.87	
Clover hay,	6 pounds, .....	.41	2.38	
Cambrill's middlings,	6 pounds, .....	.77	3.64	
		1.45	9.89	1:6.9
Brewers' grains, 25 per cent.,	4 pounds, .....	.79	1.91	
		2.24	11.80	1:5.3
Corn silage,	30 pounds, .....	.27	3.87	
Corn fodder,	8 pounds, .....	.20	2.94	
Cow pea hay,	6 pounds, .....	.47	1.92	
Wheat bran,	3 pounds, .....	.37	1.26	
Gluten meal,	2 pounds, .....	.64	1.45	
		1.89	11.54	1:6.1
Corn and cob meal,	5 pounds, .....	.22	3.32	
Wheat bran,	3 pounds, .....	.37	1.36	
Gluten meal,	2 pounds, .....	.64	1.45	
		1.23	6.13	
Corn fodder,	15 pounds, .....	.38	5.60	
		1.61	11.73	1:7.2
2 pounds more of above grain mixture, ..		.25	1.22	
		1.86	12.75	1:6.8
Corn silage,	40 pounds, .....	.36	5.16	
Corn fodder,	5 pounds, .....	.09	1.75	
3 pints wheat bran,				
2 pints gluten,	7 pounds,	1.40	3.92	
		1.85	10.83	1:5.9

FIRST DAY.—Afternoon Session.

DISCUSSION OF MR. PATTERSON'S PAPER.

York, Pa., December 4, 1901.

Q. When barley is substituted for wheat, what is the yield of protein?

A. Estimating upon a basis of 40 bushels, more protein can be obtained from 40 bushels of barley than 25 bushels of wheat.

I think the difficulty in producing crimson clover is that in some localities the corn is laid earlier than is our custom farther south. This brings the seed time of the clover earlier and the plant gets started about the time of a dry spell of weather. In our section we seed about the first week in September. We just break the ground and then seed. It is exceptional when we do not get a stand of crimson clover. The essential element is keeping up the fertility of our land.

Q. How are we to select the corn which gives a higher percentage of protein than the average of 8.5?

A. A representative grain taken from the ear will, on cross and longitudinal sections, have exposed the starch and protein layers. There is a great difference between these two layers, and from this examination you get an idea of the relative proportion of the two. Of course the corn that has the larger proportion of protein will be that which will give the highest success.

One of our friends has brought in some mixture of corn and cow pea silage. Our plan at the Maryland Station is to put in a load of cow peas and one of corn, so that each will mature at about the same time; or, the whole silo can be made of corn.

Q. Can an ensilage be made from cow peas as cheaply as from corn?

A. Not quite, per ton.

Q. About what time do you cut the cow peas?

A. For both hay and silage purposes we cut the cow peas when the most advanced pods have commenced to ripen. One of the problems upon which we are working is to secure a cow pea that will mature its crop at nearly, or the same time.

Q. Is the Wonderful cow pea, the brown, as good as the Black?

A. It depends upon what you want to use it for. It is not as rich, from the fact that it don't produce in the same time as many pods or as much grain; it requires a longer season than most of the blacks.

though there are blacks which require just as long. My preference among the common ones on the market is the Black and the Wonderful.

Q. Is not the cow pea much more difficult to handle to get into the silo than corn.

A. It is more difficult. We cut it with an ordinary mower, rake it up with a horse rake, put it onto the wagon, but it is much harder to feed into the silo. It is not absolutely necessary to cut it up to put it into the silo; we have on two occasions put it in whole.

At the suggestion of one of the members, Mr. Palmer gave his experience in raising and putting away cow peas and corn together.

Mr. Palmer: I planted the corn in alternate spaces of five and four feet so that I could get a double drill in the five foot space. After the corn was up, I run the drill through the five foot space and put the cow peas in six feet from the corn row. The pea took to the corn better than I expected. It was cut by hand with a hook cutter. In this way the stock was cut and it was easily handled. Twenty to twenty-five per cent. more labor was required to handle it in this way than to handle the corn alone. The object in planting was to get a stock of corn and a stock of peas eight inches apart. I do not imagine there would have been any perceptible difference in the amount of corn raised if I had not put in the cow peas. The entire yield was 160 tons. We are feeding it now and the cows like it very much, equally as well as the corn silage. They commenced on it about the first of last month. They run out until the weather got cold. Since being brought in they are doing well, either from being warmly housed or from the feed.

Mr. Patterson in closing his discussion, said that he thought the immaturity of the pea when put into the silo might make some difference in the quantity of milk.

The following paper was then read by Mr. H. W. Comfort:

THE FUTURE OF CONDENSED MILK.

By C. L. PECK, *Coudersport, Pa.*

Of the agricultural products of Pennsylvania, that of the dairy is the most important; in fact it overtops all others. Upon its encouragement and development hang more of the future prospects of wealth than upon any other of its important industries. The direct return from the milk product of the dairy is secondary to the steady increase of fertility and consequent increased productive capacity of the soil, resulting from the utilizing of the products of the barn and stable.

There is no industry connected with the State Department of Agriculture that requires more care and skill in the profitable handling of its products than that of the dairy. Pennsylvania is a great dairy State. Nature has endowed it with all the requirements necessary to make it one of the great dairy districts of the world. With a profitable market for its products the dairy industry of the State would at once take a prominent place in its wealth producing industries. Under our present system, the territory from whence our great cities, mining and manufacturing centres can obtain milk is limited by the perishable nature of the product. Even then the supply is attended with great difficulties, risk and loss.

Butter production requires a high degree of skill. The demand for perfectly fresh butter renders the market at some seasons of the year fitful and uncertain. The difficulty in preserving a satisfactory flavor and quality when transported long distances in varying climate renders the market unsatisfactory. Transportation to foreign countries adds greatly to this risk and correspondingly influences the cash returns of the dairy. A form of dairy product which can be safely shipped to any locality or climate will always have an assured market. A comparatively certain and regular price will be assured, and the business assume as fixed a status as any other industry in which loss of product does not occur.

The only output of the dairy which has, to this time, given any promise of such results is condensed milk. Some years since, Gail Borden, after a series of experiments, developed a process of mixing pure sugar with pure milk and condensing the whole in a vacuum.

The result was a product capable of being preserved for a considerable time. The market for milk was increased. Its use was extended to localities where before it had been unknown. By putting it in air tight cans he was able to ship it to foreign countries with moderate success. Condensed milk made in the winter time could be preserved with little change for several months. Milk so prepared was found to be preferable to the milk commonly delivered from the city milk wagon, as the process of condensing, sterilized the milk and freed it from all bacteria. The principal objection was the sugar it contained.

Later, a process was discovered in which, by the use of heat, all germs were killed, and no sugar used. By putting condensed milk made by this process in sterilized cans it could be kept in fair condition for use. This process caused a burnt flavor which rendered the product objectionable and affected its sale in the general market. A few factories have discovered a process by which this defect is to a great degree overcome. The result is an increasing demand for unsweetened milk. Canned unsweetened milk is sold under the name of "Evaporated Cream," "Condensed Cream" and the like. Milk condensed by this process is rapidly taking the place of the sweetened product. In the opinion of the writer, when the process has been developed by science and skill it will supplant the old style of sweetened condensed milk. Unsweetened milk, properly manufactured, is the best substitute for the natural product that has to this time been secured. When perfected so that this product of milk can be shipped to any climate with reasonable certainty of its preservation it will be a better product than milk in the natural state, for the reason that it will have been sterilized and the bacteria destroyed.

It may be said, "All this is interesting, but your subject is 'The Future of Condensed milk,' and up to this time you have not mentioned it."

The future of condensed milk is a question which no person can answer with certainty. A year's experience as an active member of the executive board of a condensed milk factory, has demonstrated to me that there is still much to be learned before the process of condensing milk is reduced to a science. The serious problem of making perfect condensed milk is yet to be solved.

To this time the knowledge of the process of condensing milk has been confined to a few individuals. These persons have, in the main, if not entirely, gained their knowledge from what they have been taught by the mere physical process or operation by others. They may have added somewhat to this by their own experience and experiments. These experiments have not been guided by a knowledge of the chemical changes produced by the processing. The aid of a scientific knowledge of chemistry in this processing has to this

time been almost unknown. The operator knows that "swells" (another name for fermentation) and thickened milk are the great obstacles to be met and overcome in this business. He also knows that to this time no condenser has been able to entirely overcome these obstacles. He who can reduce them to the minimum is the valuable man to his employer. His price, like that of a virtuous wife, is greater than rubies.

I have not been able to learn of a single processor who could tell me what the chemical changes are that take place in producing thick milk. Clearly it is not, as in ordinary milk, a result of fermentation. The germ of ferment is not present in it. The processor knows only the result, that it produces an unmarketable article. Apparently the milk is as perfect as when first condensed. On this question I am compelled to confess I know no more than the operators of whom I am speaking. All processors still continue to turn out milk which will swell and thicken.

Unsweetened milk that can be shipped in condensed form hundreds of miles and that will remain sweet and in good shape for use for several days is being produced by many factories. It will keep from six to twelve days, and when reduced makes a good milk for ordinary use. It often has a burnt taste. A few factories have learned the secret of obviating this difficulty. When this process is generally known and understood, milk thus condensed will form the principal preparation used in the general market. It is purer and in all respects better than the milk sold from wagons at the present time. It has been sterilized and when reduced is a perfect milk, as palatable as when taken from the cow. It contains nothing but pure, perfect sterilized milk. It is the cheapest and best form in which good milk can reach the cities. It occupies about one-fourth the bulk of milk as now shipped. The reduction in cost of transportation will nearly pay the cost of condensation.

What has been said to this point is in the nature of a preface, but like the postscript to Simon Suggs' letter, it "forms the cream of the correspondence." The future of condensed milk will be what science, skill and twentieth century education make it. In this State the Agricultural College should take the lead. To this time the development of the industry is what live energy and experimental genius, operated by "main strength and awkwardness" have been able to make it. It has lacked the aid of scientific research and chemical skill. Chemistry stepped in and taught how to avoid the burnt flavor; but so far as I am informed there is not a single so-called skilled processor who possesses any considerable knowledge of applied chemistry. What he has accomplished has been by physical experiment, unaided by scientific knowledge of chemical causes and resultant effects.

When our State Agricultural Colleges shall have taken this matter in hand and added to the present knowledge by bringing to its aid the chemical skill at their command, they may turn out a processor who will be able to produce a condensed milk that will come up to the requirements of the market; that may be shipped any distance and preserved in any climate. When this has been accomplished, dairying will be among the leading industries of the State. It will be an industry with stable product prices. The man who engages in it will be able to calculate his returns for the year with as much certainty as is now done by the iron manufacturer or others engaged in manufacturing imperishable goods whose shipments reach all parts of the earth.

Up to this time the fear of competition has impelled all the manufacturers of condensed milk to keep the process of condensation a secret. This has tended to retard the development and perfecting of methods and the enlargement of the business. The time has arrived when the State Agricultural Departments should take the matter in hand and bring the processing of milk to a point of perfection that will enable the dairyman in the remoter parts of the State to market his product in competition with others nearer the trade centers of the world, and with those of all other parts of the earth. The consumption of milk would be increased many fold. It would become an article of use in parts of the earth where it is now unknown.

The only obstacle which to-day prevents the introduction of condensed milk in both sweetened and unsweetened form more generally is the uncertainty felt by the dealer and producer as to its marketable quality remaining unchanged and the consequent risk and fear of loss; when this is overcome the future of condensed milk in its several forms is assured. The fact that one factory has largely overcome the difficulty shows that it may be done.

Let the State Department of Agriculture come to the aid of the development of this great industry, with the scientific resources at its command, and the time will not be far distant when the products of the Pennsylvania dairy shall be known to the uttermost parts of the earth.

The dairy belt is so limited that the increased demand will meet the increased supply. A product with a stable price will enable the dairyman to calculate upon a certain return for his labor and capital. The present demand for butter and cheese will continue, and a demand of enormous proportions would be added to that now existing for the products of the dairy.

Mr. H. W. Comfort: I do not see why condensed milk should take the place of uncondensed milk, since it is well known that milk pro-

perly cared for, as instanced in the Franciscus Dairy, can be kept for 28 or 29 days. This preservation is obtained by absolute cleanliness and cold. The Franciscus Dairy is one of the best modern dairies I know of, and consists of 600 cows. The stables are well built and are made with tight floors. The aim is to have no dust in the stables, and they are made one story high. The cattle, first tuberculin tested, are kept in these stables and fed on good rations. The cattle are groomed just before they are milked and a spray to keep down the dust is used. The men when milking wear overalls and jackets. The milk is poured into four quart cans and are started to the milk house by an endless wire chain and the empty cans returned. The milk is bottled and capped and moved into cold storage, and sometimes covered with chopped ice.

THE INFLUENCE OF THE CREAM SEPARATOR UPON THE DAIRY INDUSTRY.

By P. M. SHARPLESS. Read by MORTON DECHERT.

While a most interesting history of what this influence has been and is, might be given, the separator having in fact practically revolutionized dairying, yet just a practical business man like myself and practical dairymen such as are here, I am sure, are much more interested in what is to be than what has been. I do not think it argues that we are unduly mercenary if right now we are more interested in the dollars that are to be made than those that have been made in the past, and spent or salted down for a rainy day, perhaps. At any rate, it is a business man's way to be more interested in the practical results that are to be achieved in the money making line in the future, than to be sentimentalizing over the past, however, interesting the latter may be.

I think there is a method of creamery operation not fully understood or appreciated by a large proportion of Pennsylvania and other eastern United States dairymen, that means thousands of dollars of additional profits per year to our cow keepers and milk handlers, than prevailing methods, so the parties who got up the programme will have to excuse me, if my business man's training sticks out so much above my historical proclivities as to spoil their programme to the extent of talking about the Moody System of Creamery Management, instead of the other matter.

The persons, that is to say farmers or dairymen here, whose attention I would especially like are those who, when ready to harvest their potato crop, dig up and cart away the whole field, potatoes, potato rows, the earth they grow in, the vines, roots and everything, take them to market, and require their customer to pick out his potatoes from the soil, leaving it to be carted back home again. Also those who take their corn shocks complete to the mill, that is, corn, corn husks, fodder and all and require the miller to pick out the corn, so that the fodder may be hauled back home again and a second trip made to get the meal and the corn husks. Then the man who expects to have eggs for sale and hauls his hens to market and leaves them while they lay their eggs, then goes for them to bring them home again, should pay attention. Also there may be a man here who instead of bringing back the soil that he took away with him and in which his potatoes grew, leaves this fertile material and tries to grow his next crop of potatoes in the unfertilized earth that was under the soil,

At any rate, I will venture that there are dairymen here, who are doing the exact equivalent of these things with the product of their herds. In fact there are dairymen here who parallel in the marketing of the output of their herds, all the methods I have mentioned for marketing their other products, and if such is the case, I believe they are losing money by doing so, just as it appears to me they would lose money if they are handling their potato, corn and egg business in the manner suggested.

If a farmer hauls a ton of milk to the creamery, out of which the creameryman is to pick a bushel and a half of butter, is he wiser than the farmer who hauls a ton of earth to the market man and has him pick out a bushel and a half of potatoes? Rather he is less wise of the two for the soil can be brought back in good condition, but the milk will be spoiled, and three-fourths of its value lost. The man who don't even bring back the soil, but leaves it with the dealer to make roads will be thought extra foolish, but how about the man who leaves his milk? The only value that soil has, is the fertilizer in it, for the farmer has plenty more earth at home in his hills, but it has little value for want of fertility, but farmers who think they are wise are constantly hauling the fertility of their farms away and leaving it in the milk they don't bring back. Some dairymen may have been led to believe that it is necessary to take the milk to the creamery to insure good butter, but it is much more necessary to take the hens to the buyers to insure good eggs. I am a separator-man and like to sell separators to creamerymen. A few years ago that was my whole business, but now I would rather sell separators to farmers, who will sell their cream to the creameryman. Not that there is more margin of profit in it for me, for there is less, but I know it is better for both creameryman and dairy farmer and thus better for me.

The principal difficulty in the way of installing the improved Moody system, is, I think, due to a failure to fully appreciate the advantages, and a disinclination to get out of one rut and into another. The jolt is disagreeable. One might imagine that the cost of the necessary farm separator was in the way, but it is not, for the separator men that I know, are those rare and liberal kind of people who have a good thing to give away free. They place their separators and take a part of the saving made by the separator under the Moody system, as pay for it.

The creameryman objects on the ground that at heavy expense he has his creamery fitted with separators for handling whole milk, but it is wrong for him to do so. It reminds me of the men whose objection to going to heaven was that he had a new pair of shoes that he did not want to waste.

I sympathize with the creameryman in this particular, for it is a kind of medicine of which I have to take a great deal myself, and

though I know it is good, I can hardly make myself believe it. At this moment, there are machine tools, which cost many thousands of dollars, standing around in the different corners of our works. They are practically in as good order as the day they were bought, and will do as much and as good work. The trouble is, that improved manufacturing tools are coming out each year.

Five years ago perhaps a certain piece of manufacturing operation required, in addition to an expensive machine tool, a high priced journeyman mechanic to operate it. Two years later an improved tool is invented which will enable a comparatively cheap, unskilled man to turn out more and better work. The saving by its use will be sufficient in a year's time to pay its cost, so, of course, we buy it. Two years more and another machine is presented. This time it is an automatic machine which does not require any constant attendant whatever, and it turns out work of absolute uniformity. The former machine is perfectly good, just as good as it ever was, but it don't owe us anything, it paid for itself in its own savings the first year of its use, and here is another machine, guaranteed to still further save, so out goes the old one and in comes the new.

Having secured an automatic machine, it would seem as though the end has been reached; but right now I have a proposition from another builder of machine tools, who proposes to put us in an improved automatic machine, guaranteed to do double the work, and with a slight saving in material, so if he can prove it, out will go the former machine and in will come the new one.

It is plainly, money in our pockets, to discard these out of date machines and methods, and we do so quickly when opportunity presents. But really, I will confess, that it is pretty hard for me to throw them into the scrap pile, where they should go. It seems a shame to throw such elegant tools away, so, lacking the proper moral courage, I have the discarded machines pushed over into one corner, where I can keep on looking at them, and then, when we get extra scarce of room, they will be put into an outside shed, and from there pushed into the scrap heap by degrees. Luckily, we have horse-sense enough, to substitute at once a new machine for the old as soon as it can be demonstrated that it is worthy to succeed it, but it is hard work to let the old ones go out of our sight, so, "like good-night in the hall-way," they hang around for some time. But we see that they do us no harm, except taking up a little of our spare room, and the cream-eryman who is in an equivalent position, should see that an inferior method, is not losing him money, even if he does have to throw away the machinery, he thinks as good as new.

The great inroads which American machinery has made in the trade of foreign countries, notwithstanding the cheap labor of those countries, can mainly be attributed, I think, to the American manu-

facturers' readiness to throw away an inferior and substitute a superior machine, no matter in how good condition the former may be. A European manufacturer thinks only of substituting a new machine when the old one is worn out, not when it is out of date, and while he is wearing it out, he is losing the price of half a dozen better ones. While in Europe a year ago, a large manufacturer there, was explaining to me, how they were going to meet and beat American competition. His scheme was to come right over to America, and buy some of their best machine tools and then make others just like them to fit his factory out with.

This explanation made me smile, for it is a fact that before he could have duplicated the American machines, the patterns would have been superseded in America, by machines of such superiority as to make the former valueless. At any given time, it may seem that we have reached perfection in our methods, and there is no further room for improvement, but the hour when such is the case, never has come, and never will come. There are separator parts which cost us a few years ago \$1.35 each to make them, and by methods which we thought first class. We can now make the same piece for less than three cents each, and improvement in the method is the only reason for it.

I have said a good bit on this subject and am quoting from what I know to be facts in my own business, with the object of impressing on the creameryman and dairyman the importance of being always alert and open to grasp a new thing, if it is a good one, no matter how well he may think he is doing under his present system, nor how well fitted out he is.

The first attempt, that I know of, to establish a complete and systematic creamery on the farm separator plan, was made by Mr. W. I. Moody of Waterloo, Ia., and for that reason we call it the Moody system all over. Its great feature is, that it is a system, a complete and systematic system, and a failure to understand this, will account for want of appreciation of its possibilities and benefits. The Moody system creamery is one in which every patron, without exception, uses but one kind or make of dairy separator, for separating all his cream, which he sends to the creamery. The cream is gathered by special cream wagons, provided with special cream carrying cans and travelling over well planned and systematic routes, arranged very much as "Uncle Sam" arranges his rural delivery routes, the idea being to get a full load of cream, with least distance possible travelled.

One of the men employed in the gathering of the cream, must be an expert with the kind of separator in use by the patrons. It were best that he should have spent a week or ten days at the factory where the separators are made, so as to become entirely familiar with

them in every part. He should be a *high class man*, capable of seeing and knowing whether or no, each patron whom he visited, was caring for his cows properly, caring for his cream properly and in all ways running his dairy properly. He should personally see that the separators were always kept in order and doing the best possible work and should be provided with the necessary parts and tools for repairing and renewing any worn or injured part on a separator. This man should go over all of the different routes as frequently as possible, and his services in keeping every patron right up to the highest standard will be extremely valuable and will thus, easily, secure a service not now secured by any whole milk factory that I know of.

As is well known, great skill and knowledge is needed at every stage in order to turn out the very finest grades of butter, and the creamery managers will be able to select but one man out of a thousand who is a sufficiently educated butter-maker, to give entire satisfaction in performing the later operations of making butter. But this same management will intrust the first operations, those of producing and caring for the milk, to any and every milk producer in the neighborhood, and that with practically no supervision whatever. That is what they are doing now. Out of one hundred patrons under such a system there must be one hundred men, highly expert in this first operation of butter making, or else the butter cannot be of the highest quality, for there is no one to watch or oversee them. One poor batch of milk, not necessarily bad milk, nor milk that would be refused at a creamery, but milk that has come from cows fed or housed improperly, or milk that has been just a little less carefully handled, will leaven the whole lump, and no matter how skillful the butter-maker, his butter will be just a little bit inferior to what it might have been.

But the expert who travels on the wagon of the Moody creamery, is in a position to nose into the milk producing affairs, of every patron, and that very frequently, and musty feed, poorly ventilated stables, sick cows or careless milk handlers, will be liable to come very quickly to his notice, and the expert advice and assistance he can give, on the spot, to the farmer in any emergency will be almost priceless in value.

The Moody system combines the advantages of both the separator creamery and the gravity-cream-gathering creamery. It is generally recognized about here, that the separator creamery, is so much superior to the whole-milk creamery without a separator, that the latter cannot exist, but it is perhaps not so well known that the gravity-cream-gathering factory, has proven itself, also the great superior of the old, gravity-whole-milk factory and almost, if not quite, the equal of the separator factory.

But the points of superiority in each, while almost equalling one another, are entirely different from each other. The absolute necessity, of a centrifugal cream separator in any whole milk factory, devoted to butter making, of course, will be conceded. So necessary is the separator in such a factory, that without it the creamery would be compelled to go out of business in very short order and years ago, all of them necessarily went out of business, or bought separators.

Long after the whole-milk-gravity creamery had gone out of business, the gathered-cream creamery, using gravity cans, held on and thrived in many districts. It is still largely in use, but it is now fast succumbing to the march of the farm separator.

The fact that it held right on, in close competition with the separator creamery, notwithstanding its heavy loss of butter fat through imperfect creaming, amounting in itself to a big profit on the business, shows that it must have had some advantage over the separator creamery, sufficient to offset or equal the great gain in butter yield, secured by the separator. In other words, the advantages peculiar to the gravity-cream-gathering system, were the equivalent of the advantages secured through the invention of the factory separator. Consequently, if we can devise a system that secures both of these advantages, that is, those peculiar to the gravity-cream-gathering system, and those due to the invention of the centrifugal separator, then we will have a system possessing twice the advantages over the gravity-whole-milk system, that the factory-separator creamery, which you are now conducting and patronizing, has over the same system.

Perhaps you don't fully catch my meaning. To explain more fully, if you are running a factory-separator creamery now, making say four hundred pounds of butter a day, you are making, at least thirty-five pounds more butter per day, than as though you were to set the same milk in the old fashioned vats and raise the cream by gravity. At twenty cents per pound for butter, this would represent a gain of \$7.00 per day or over \$2,500.00 per year more profit for the factory-separator creamery than the old method.

Now the gravity-cream-gathering factory, is considered by many the full equal of the separator factory. It has held right on in many sections in spite of the best competition which the whole-milk-separator factory could put up against it. This should then prove that it is as much superior to the old gravity-whole-milk creamery, as the factory-separator creamery is superior to the same thing. In other words, it is also, at least, \$2,500.00 per year better and will show that much more profit. But it gets its excess profit from something else than the increase of butter yield, for there is no increase, as no separator is used. Now if we can combine these two sets of advantages so as to get all the profits of each and both of

them, we will then have a 400 pounds per day creamery, showing over \$5,000.00 per year more profit than the old gravity creamery could be made to show.

I hope you fully understand just what I intend to show by this comparison, for none of these figures nor assertions are based on any theory, nor supposition, nor mere idea, but they are actual, practical facts, being daily demonstrated by yourselves, and hundreds of others all over the country. Those figures show you, and show you unquestionably, how to make \$5,000.00 per year profit out of a creamery, which on the factory separator system makes \$2,500.00 per year profit.

It's a plain, easy, proposition, which cannot be gainsaid, and it puzzles me, why the Pennsylvania creameryman don't grasp it quickly even if he should have to throw that brand new factory separator into the scrap pile. Mark my word, you or your patrons will have to pay for that separator over again, every two or three months, as long as you keep it in use. Take my advice and put it on your mantel-piece, for the good it has done, and don't compel it to disgrace itself by losing for you all it has made, before better methods were known.

The advantages peculiar to the factory-seperator creamery are a gain of from fifteen to twenty per cent. in butter yield from the same milk, than the gravity system would give. In addition to that, a better quality and more even quality of butter. Large saving in ice and in room. An independence of weather conditions. The advantages peculiar to the gravity-cream-gathering system, consist in the saving of a lot of the farmer's time or his helpers' time. Also horses, harness, wagons, blacksmith bills, etc., which, for some unaccountable reason, entirely too many farmers count as nothing. Also in keeping at home, the skim milk from the farmer's own herd in place of bringing the mixed milk from numerous dairies, some of them more than liable to be diseased, and thus the disease spread through his herd and the country. Also the fact that far larger territory can be advantageously covered by cream gathering wagons, than is the case where the whole bulk of milk is hauled to the factory and back again.

Now, as stated, the Moody system has all the advantages of both of these system and is necessarily profitable accordingly, but beside these it has still other advantages peculiar to it alone.

One of the greatest of these is the warm, fresh, wholesome skim milk left on the farm ready for immediate use in stock feeding and for other purposes. Its value in this shape is three or four times what it is after it has become stale and sour. It is a most wholesome, strengthening, nourishing food for all kinds of stock, horses, cows, calves, pigs. It bears almost no relation to the sour

article, in fact it is a different kind of food. A calf will grow strong on one and die on the other.

Another important advantage of the Moody system, is that of making both creamery owner and farmer, more independent of each other. If the farmer does not wish to sell his cream to the neighboring creamery owner for any reason whatever, he is not compelled to do so, as he sometimes is with whole milk, but can, on account of its comparatively small bulk and better keeping condition, market it elsewhere; while the creameryman, having only cream to handle, can bring it from a greater distance and does not have to take the product of some dairy, which is not up to the standard in quality, but which the whole milk factory owner often has to take to prevent the volume of his business being too small. Under this system, the creameryman cannot oppress the dairy farmer and the dairyman cannot impose on the creameryman.

Now I have, of course, often had this Moody system creamery project up, with owners of creameries, and after I have argued them to a stand still on all other points, they will raise a question about the quality of the butter and insist that it cannot be good. I suspect that they do this, for the want of anything else to say, and not because they really believe it. At any rate, I don't see what ground they have to stand on. Certainly any farmer, competent to take care of the cream when mixed with the milk and more or less dirt, and get it to the creamery in good shape, can and will take better care of the cream in concentrated form and freed from dirt and bad odors to a large extent by the separator. With either of the old systems there are necessarily disturbing elements tending to the deterioration of butter quality.

In the whole-milk system, the milk is frequently kept warm for too long a time, and is always jogged over the road in partially filled cans, while the reheating of the milk for separation is very often improperly done. In the gravity-gathering-cream system there are many features hardly necessary to mention, which not only tend towards, but compel an inferior quality of butter. It is a fact not only in theory, but actually, that better butter is to be made by the Moody system than either of the others. We operated the Moody system creamery at Nashua, Ia., for a long period, and never failed to produce butter, which brought a higher price in the market, than that from any neighboring creamery, operated on other systems. The success of this creamery was so great, that a very large proportion of the creameries in that part of the country, have copied it, and practically all will do so within a short time.

The system is sweeping the States of Iowa, Kansas, Nebraska and adjoining country. In most every issue of the western dairy papers will be found little items, showing that the dairymen there are wide

awake on this subject. The last issue of the *Elgin Dairy Report* contains the following:

"It is useless to deny the fact that the hand separator is—slowly but surely—invading Nebraska, and it cannot be too much regretted that not all the creamerymen foresaw this as did my old friend Sutton, of Table Rock. Just think of what a saving it would have been if the farmers had been induced to take up the hand separator at the old gathered-cream creameries. I do not have the actual figures, but I understand that one combination has \$275,000 worth of old creameries and skim stations and should guess that not less than one million dollars invested in separator creameries and skim stations in Nebraska will be lost completely when the hand separator has finished its triumphal march."

Also on the Pacific Coast, especially in Washington and Oregon, the system is becoming almost universal. The Albany Butter and Produce Company's creameries of Salem, Ore., operating exclusively on the Moody system, with but one make or kind of separator in use, operated systematically throughout, has just received the highest score given to any butter in America this season, 99½ for its product, at the Oregon State Exposition. The significance of the score is enhanced, when it is known that the highest score received at this Exposition by butter from a creamery operated on any other system than the Moody, was the Hazelwood Creamery. Its butter scoring 90½, showing that there was no tendency on the part of the judges to score butter higher than its merit warranted.

California's two most prominent creameries are into it; one of them has already introduced the Moody system and the other is now negotiating to do so at once. One of these made the highest score on butter in the State for three years in succession, and the other has paid the highest price for milk, to its patrons, for a long time past, of any other creamery in its part of the country.

I quote this only to show that very good is not good enough for them, but if there is anything better to be had they want it. It is this spirit that has kept them in the lead in the past and will do so in the future. Remember now that the western part of America bears the same geographical position to us, that we do to Europe.

Europe has fallen behind and will continue to fall further behind in her manufacturing, and America will continue to advance, because the one is conservative past the profitable point and is not quick to grasp an opportunity, while the other is instantly ready to take up an improvement. Let it not be that our western States also grasp, and put in profitable use, a system so long before our own dairymen do so, that we will fall behind in the race.

DISCUSSION.

Mr. Galbraith: I do not think this part of our programme should be passed by without notice. This is certainly a valuable paper coming from Mr. Sharpless who is interested in the sale and manufacture of separators, and I would like to know the opinion of the dairymen as to whether this Moody Separator is practicable in Pennsylvania in herds of eight or ten cows.

Professor Hills: I see no reason why the separator is not practicable in a small dairy. The different makes of separators are made in all sizes and the prices are correspondingly small. It seems to me, therefore, entirely feasible to use the separator in a dairy as small as five cows. I have urged all through the State that no dairyman can afford to do without a separator if he has as many as five cows.

Mr. Dechert: The principal argument brought out is the saving of time and labor to the farmer which of itself is a profit. Statistics show ten cents per hundred pounds for these items of expense. On a basis of four pounds of butter to each 100 pounds of milk, the cost of two and one-half cents per pound is a valuable item, but one which seems to be lost sight of. Not only is the expense of hauling saved, but by having a separator on the place the cream can be separated in the time required to hitch up the horse for hauling. Another advantage is in having skimmed milk for feeding with more nourishment than when brought back from the creamery. This as the increased value of the stock is an item not to be overlooked. The farm separator has an advantage also in that all kinds of cream are not mixed as when cream was separated by the gravity system. The chances for good butter are therefore increased. I predict that within the next ten years the farm separator will supplant the present factory system.

Mr. Jacob Harts: I would like to ask why the Moody Separator Company will assume the expense of keeping the separators in order and hauling the cream to the creamery.

Mr. Dechert: It has been demonstrated that a man can be sent out to gather the cream at two-thirds the expense of handling the milk after it is brought to the factory.

Mr. John I. Carter: I think the trend of advance is not in the line of individual manufacture. How would it do if the individual farmer would undertake to kill his own beaves or manufacture his own grain into flour. In the nature of things, and to secure profitable results, the manufacture of butter for the consumers of this country cannot be done by the individual farmers.

COMMUNICATIONS.

Secretary Hayward read a communication from the Department of Public Instruction at Harrisburg stating that in accordance with the authority vested in their executive committee by the convention

of agricultural organizations, held at State College, June 5th and 6th, 1900, another conference was called to meet at Harrisburg, January 21, 1902, to hear the report of the legislative committee, and to further consider the promotion of agricultural education in all its branches in Pennsylvania. It was moved and carried that the former delegates should represent the Pennsylvania Dairy Union at this meeting at Harrisburg.

A communication from H. P. Armsby, Dean of the Agricultural School, Pennsylvania State College, was read to the effect that the school has maintained a creamery course and graduated a considerable number of young men. The organization of the dairymen of the State as represented by the Pennsylvania Dairy Union it was thought should have a view to a somewhat closer union of forces between them and the college. The certificate which is now given by the college to those who successfully complete the creamery course, appears to be highly prized by the students and recognized by employers. Its value it would seem would be increased in both respects if it were possible to bring to the aid of the college instructors to aid in awarding the certificates, the practical judgment of expert dairymen representing the Dairy Union, and there was suggested the appointment of a small committee to act in conjunction with them. The Dean's name and the names of the men on the committee would thereby attached.

Another communication was read from E. S. Bayard, of Pittsburg, Pa., secretary of the Pennsylvania Live Stock Breeders' Association, in which he stated that they desired to have the meetings of their association and the Dairy Union held together. He suggested leaving the time and place of the next annual meeting in the hands of the Executive Committee or special committee, and he would endeavor to get the Breeders' Association to do the same thing. The organization could be taken to one end of the State one year and to the other the next.

A communication from E. Sudendorf, secretary and treasurer of the National Creamery Butter Makers' Association, dated Elgin, Ill., was read, expressing the desire for the endorsement of the Dairy Union for the position of Superintendent of Dairy Exhibits at the coming St. Louis Fair. It was stated that the Iowa and Minnesota Butter Makers' Association had seen fit to endorse him.

Mr. Carter moved that the various communications be referred to the Executive Committee with power to act. The motion was carried.

GENERAL BUSINESS AND APPOINTMENT OF COMMITTEES.

Nominating Committee:—Major Wells,
W. C. Norton,
I. P. Thomas,
Mr. Reist,
J. P. Sharpless,
Henry Palmer.

Auditing Committee:—John I. Carter,
N. J. Monroe.

Resolution Committee:—H. W. Comfort,
F. P. Forney,
S. F. Barber.

MILK MAKING IN THE TWENTIETH CENTURY.

JOSEPH L. HILLS, *Director Vermont Agricultural Experiment Station, Burlington, Vt.*

The press has been full of retrospect during 1901. The nineteenth century and its wonderful record of achievement in every field of human endeavor has been its theme. The legacies of the eighteenth to the nineteenth centuries have been contrasted with the bequests of the latter to the twentieth. The former methods of human communication, stage coach, sail boat, letter and beacon fire, have given way to the Empire State express, the ocean greyhound, the long-distance telephone and wireless telegraphy. Old Dobbin and the pedestrian are distanced by the automobile, the trolley car and the bicycle. In the realms of power and energy, the tallow dip and the horse-power are superseded by the arc light and the dynamo.

Most of these comparisons have had to do with inventions modifying methods of transmission of thought, matter and energy. These have wrought such vast changes in the affairs of the human race that they deserve prominence. Yet agriculture has not lagged behind in the evolution. Though long asleep with the other arts, though still conceived by the professional humorist to be a back number among the industries, her triumphs of achievement of the last ten decades have been notable if not spectacular. Specialization rather than "all round" farming is common to-day. Machinery replaces hand work; brains supplement muscle.

Milk making has vastly changed since 1880. It is said by Prof. Cooley, that the town records of Hadley, Mass., state that in the early days of its settlement the cows gave so little milk through the winter that the babies had to be brought up on cider. They were born too soon. To-day the winter feeding of cows is based on accurate knowl-

edge of animal needs and the fitness of sundry rations to meet their needs; the silo replaces the cornstalk and vies with the pasture as a milk maker. Cows making 30,000 pounds of milk yearly and 1,000 pounds of butter are said to be products of recent days. Centrifugal separators and combined churns and butter workers replace the shallow pan, the tin skimmer, the dash-churn and the butter bowl. Co-operative dairying obtains instead of each man for himself and the soap grease man take the hindermost. Pastenrization, modification, certification and the artificial ripening of cream and cheese are the vogue to-day rather than uncleanness and haphazard methods.

Can the twentieth century at its close show as vast a revolution in dairy lines? Will our grandchildren and great-grandchildren, assembled at the 104th annual meeting of the Dairy Union, smile contemptuously at the antiquated and ill-adapted processes of their forbears? I believe that the advance has but begun, that we do not know it all, that much we do know is yet to be applied in our daily work, and that improvement is the order of to-day, and of all the to-morrows of all time to come. What of the future? In what ways will milk making in the twentieth century differ from that of the nineteenth? I look for change along three lines:

I. A more general diffusion and application of truths now known pertaining to dairy practice, more dairy education and research, more open-mindedness, more energy.

II. Better cows, better kept; better milk, better sold.

III. New discoveries will modify old methods and cause new ones to be devised; new economies and efficiencies will be introduced; new men will "ring out the old, ring in the new."

I shall hold that the obligations of twentieth century milk maker are greater than those of his predecessors; that the knowledge and appliances which the nineteenth century has put at his command are such that he owes it to the consumer that he make a better product, to himself that he make it more economically, and to his neighbors, that he help them to see the new light.

Now let us develop these propositions.

I. MORE LIGHT.

The dairying practice of 1800 was in most respects but little advanced over that of centuries back, save as regards the character of the cattle, which was beginning to be improved by careful breeders. The first half of the past century did not see much advance in methods of manufacture, but during the last fifty years a revolution has been wrought in all the branches of dairying. No man knows it all—many think they do—some know and practice, some know and disregard, and some are uninformed.

Up to about a generation ago there was but little organized effort looking toward the diffusion of dairy intelligence among the people, and little readiness on their part to receive it. Within the past thirty years, however, agricultural education—using the term in the broad and not in a restricted sense—in common with the advance in all educational affairs, has made great strides. The dairyman now reads the agricultural press, joins farmers' organizations of sundry kinds, attends farmers' institutes, notes and makes use, so far as may be, of the various activities of the agricultural school and college. His horizon is no longer limited, but, thanks to these several agencies, he can know what is going on in the dairy world, can post himself on newer ideas, and increase his chances of success.

This educational effort, however, has not been as effective as it might have been or as it is yet destined to be. There has been much scattering of effort, lack of co-ordination, much experimenting with methods of presentation of ideas, and many mistakes made in the editorial sanctum, on the institute platform, in the college lecture room and in the experiment station laboratory. Then, too, all dairy-men have not been of the type just cited. The teachers of the press, the agricultural associations and the colleges have often to encounter the indifference, incredulity and hostility of those whose best interests they serve. I don't want to hear any of your theories; I don't believe a word of them; I have no use for book farming; those fellows don't practice what they preach; 'taint practical. How common in bygone days were such remarks! The tribe is not yet extinct; but its numbers are fewer, and there is great hope of the next generation.

The children which are coming up to take our places ought to have a better chance than ourselves. Their minds are in a receptive state. Possibly that very disrespect, of which we are apt to complain, will make it easier for them to grasp and to believe a dairy truth which their fathers have not credited. They will get the benefit of the greater effectiveness and the better co-ordination of the sundry lines of effort in agricultural teaching resulting from past experience. I look for the introduction of agricultural teaching in some form, direct or indirect, in our public schools in the near future. I noticed in a dairy paper some time ago, an excellent scheme for instilling a fundamental truth about dairying into the children's minds by insinuation. The proposition was to take examples from agricultural rather than from commercial practice. My little daughter brought me her arithmetic paper the other day. One of the questions read: "A man bought cloth for 31 cents, sugar for 24 cents and salt for 11 cents. How much did he pay for all?" Now, why might not the question read: "The cow Bettie gave 31 pounds of milk, Topsy 24 pounds and Spot only 11 pounds. How much did they all give?"

The problem given her simply recorded a commercial transaction of no importance. The cow query would have insinuated into her childish mind the notion that cows give different quantities of milk. Subtraction would show how much less Spot gave than Bettie, and multiplication how much more Bettie gave in a year than did Spot, and so on *ad infinitum*, instilling in this devious way agricultural truths of prime importance into the young mind without taking a moment's more time.

Then, too, why not agricultural readers? There is probably truth in the contention that public school curriculums are overcrowded; there is room for question as to choice of studies; and many believe that too little of too many things are taught. Perhaps agriculture should replace some branch now taught; perhaps not. I shall not argue the matter to-day. The notion I have here advanced, borrowed from one of America's brightest dairy writers, does not add an hour to the school life or lessen the time given to or the usefulness of other studies, but by indirection and insinuation teaches something of agriculture. Surely the art which feeds and clothes mankind is not unworthy of attention in the lower schools. It is coming! It is in the air! Nature studies in the schools, young naturalist' clubs, domestic science, university extension courses in agriculture, reading courses, dairy schools and the like are all preparing the way. New York and Minnesota are leading the procession among the States. Teachers, scholars and parents alike are attracted. When the child learns to look upon the farm not merely as a place of drudgery, but as a scene of great possibilities; when he knows that the handful of soil is not simply dirt, but that it is rock pulverized in Nature's mills, watered by the sun, that it is not inert, but full of life and energy; when each bird and bush and blossom tells its story to his quick eye and active brain; when Nature's secrets have been taught to him in the schoolroom and in rambles afield with his class, and he can see and know and understand the whys and wherefores; then will he be the more apt if he stays on the farm—and he is far more likely so to stay—to make a success of its management, to see "Sermons in rocks, books in the running brooks and good in everything." Have I gone afield myself? Have I strayed from my topic? I think not. The milk-making of the twentieth century will be in the hands of the children of to-day. Let us remember that not gluten meal nor silage is as necessary to success in that calling as is intelligence; that the cultivation of one's acres is of less importance than that of one's brains.

II. BETTER COWS, BETTER KEPT; BETTER MILK, BETTER SOLD.

Here is a big proposition, a betterment all along the line. Better cows, better kept; better milk, better sold. A poet some time back pointed out the folly of attempting to gild refined gold or to paint the

lily. Does not this undertaking resemble this task? Can 1,047 pounds of butter a year be exceeded? Can a single cow make much more than 30,000 pounds of milk in a year? Can cows be kept better than they are now on some model estates? And can better butter be made than the dollar a pound brand of the Darlingsons or better milk than the 12 cents a quart variety from Francisco's farm? And can they ever be sold at better prices? Probably not; but there may be larger numbers of the Pieterje Hs and Signal Lily Flaggs; more Levi P. Mortons, Franciscos, Gurlers and Darlingsons, and, I believe, more dollars.

Let us argue the matter somewhat. Many of the things, let me say, have been told over and over again by more eloquent lips than mine. Some of these old stories, however, bear repetition. Everyone has not learned the lesson. The Sermon on the Mount was spoken nearly 1900 years ago, and has been repeated time without number in the ears of the multitudes; and yet there are rascals in the world.

BETTER COWS.

Some few months ago I chanced to run across "The Agricultural Reader," published in 1824. It contained some fifty articles of all sorts related to farming, including directions for the manufacture of sundry beverages, for the erection of lightning rods, for the apprehension of fruit stealers as well as indicating the means whereby one might know how to detect a poor farmer. If most of the ideas in this book of three-quarters of a century ago were re-dressed in the language of to-day and reprinted in modern type they would pass current as the notions of 1901. Of the poor farmer it is said "He grazes his mowing land late in the fall and his pastures early in the spring, and consequently ruins both. Some of his cows are much past their prime. He neglects to keep the dung and the ground from the sills of his buildings, and it costs him twenty dollars to make repairs when one dollar's worth of work would have been sufficient if performed at a leisure time ten years before. He sows and plants his land until it is exhausted before he thinks of manuring. * * * He says he cannot farm it for want of money. * * * You will perhaps hear of his groaning about hard times frequently in a bar-room. * * * He will tell you he 'never had no luck.'" Does it not sound familiar? Now as to cows: "It would be well for every person to ascertain the qualities of the milk of every cow individually as soon as she is turned into the dairy; otherwise he may proceed for years without knowing that he is subjecting himself to great expense without deriving any advantage from it." Rules and methods are laid down whereby this might be done.

Seventy-six years ago this notion—that there were cows and cows—was abroad in the land; yet there are to-day thousands of dairymen who have not realized it. Some six years ago the Vermont Board of

Agriculture published statistics showing that the average production of the Vermont cow approximated 156 pounds yearly. One town reported 259 pounds as its average; another but 92 pounds. I have greeted dairymen from the former town at many a meeting. They come every year. I have not seen nor have I ever seen at an agricultural meeting a representative of the latter town; yet its dairy-men need light a thousand times more than do the Ryegate farmers. The difference is not so much in the cows as it is in the men. There is less need of a new breed of dairy cows than of a new breed of dairymen. I am looking for that new breed in the next generation.

The dairymen of bygone years did not have the best chance in the world to discriminate between the good and the bad cow. The little book from which I have just quoted gave cumbersome rules whereby one might obtain the value of this, that and the other cow. These are all done away with now. Dr. Babcock's method enables one to tell whether his cows are worth keeping or not. We have not time to go into the details of the Babcock test, but it is not difficult for any dairyman who has either a Babcock of his own, or knows of one that he can use, or can pay 25 cents expressage to send samples to the experiment station to tell the quality of milk his cows give. The Babcock, however, does not tell the whole story. Most people think it does, but they are mistaken. The quantity of milk and the cost of making it are important. A small scales, a Babcock machine and an observing eye constitute the needed apparatus. When properly used in conjunction one with another the results are of the utmost value.

Some seven or eight years ago the experiment station dairyman left us to take a position upon the farm of a gentleman of whom I think you all have heard—Mr. William K. Vanderbilt. He wrote us some weeks afterward as follows: "I want to tell you what the Babcock test has done for Mr. Vanderbilt; it has killed eleven of his cows. Mr. Vanderbilt told me he could not afford to keep cows that didn't pay their way." If Vanderbilt can't afford to keep unprofitable cows, who can? There is an old adage which says that actions speak louder than words. There are many dairymen who by their actions say they can afford to keep cows that don't pay their way. There is no excuse for keeping that class of cows unless they are kept for the pleasure of their company.

If the farmers of this and other States would get away from the antiquated notion that there is such an animal as the general purpose cow, it would be to their advantage. Governor Hoard has said that he was ready to believe in the general purpose cow when the breeder thereof would show him a general purpose dog that would point a partridge, trail a fox, and fight like a bulldog. The simile is very apt and points a moral.

A good cow above everything else, unless it be a wise dairyman,

is essential. Buy her, breed her, steal her if you must, but get her anyhow. And having got her, resist the blandishments of the cow buyer and keep her.

FEEDING.

I cannot hope to tell you all there is to stock feeding in five minutes, but there are a few of the essential points, probably known to you all, which I can emphasize. There are two great classes of foods which cows as well as children need; they are the flesh formers and the heat producers. You can get all of these heat producers you need on any farm in Pennsylvania, if it is properly run. You do not have to send to Kansas and Nebraska for this class of food. When you go into the market to buy, do not spend money for the heat producing food which you can grow on your own farms in great quantities, but buy food containing protein. "How are you going to know what is what?" This has been many times determined by analysis. Bulletin No. 81 on "Principles and Practice of Stock Feeding," published by the Vermont Station, has proven serviceable to many, and will be sent without charge to any one who wishes it.

It should be borne in mind here that many a cow never had a "fair show." Many cows have not paid their way because the food given them was not fitted for milk making. It pays to study dairy feeding and to give the cows a chance.

ENVIRONMENT.

The housing of animals is a part of the "better kept" proposition. Some animals are kept too warm and some too cold. I have seen cases where animals were kept in such close stables that it seemed wonderful that they had enough air to breathe; and others, again, under conditions where it seemed as if they would freeze to death.

It is said that there was introduced, by request, in the Vermont Legislature of 1896 a bill which provided that after January 1, 1900, all of the barns in which cattle were housed should be so modified that every cow should stand with her head in the open air and her body inside, so that she might get fresh air enough to breathe. I think the bill must have failed of passage, for I have not observed the modification in the barns.

If a barn be too warm and air insufficient, tenderness and predisposition to disease may result. If it be too cold and so well ventilated that a cat might be thrown through any corner, the cows suffer from exposure and burn the food within their bodies as fuel. Governor Hoard tells the story of an Arkansas jury which returned a verdict for itself instead of for either contestant on the ground that it had not received its fees. So the cow will find for herself first when she is not properly cared for. She will use food to clothe herself with fat; the residue, if any, will go into the milk pail.

CLEANLINESS IN THE DAIRY.

Wherever dairying obtains twice a day all over the dairy districts dirty men, dirtily clad, take dirty pails into dirty stables and milk dirty cows. The clean, pure milk as it streams from the teats becomes foul at once, contaminated by its surroundings. It may make good butter even then, but the chances that it will not do so are greatly enhanced by its contact with dirt. Does it pay to be cleanly in the dairy? I do not advocate extreme care under common dairy conditions, but there is certainly room for much improvement. We card our cows at the station. Does it pay? Yes and no. It does not add a pound of milk or an ounce of butter to the yield; but it aids us in making a high grade of product.

I have in mind a milkman in a Vermont city who started in some years ago with the idea of making clean milk in cleanly surroundings. His competitors derided him and said, "You can't afford to take the care of your stables you do, or to keep the cows in so cleanly a condition." What was the result? He has much the largest trade of any milkman in the city. He states that he hardly ever loses a bill, because he deals with the best trade in the city. It pays the milkman; it pays the farmer: it pays anyone to endeavor to keep everything pertaining to milk in as cleanly a way as practicable; if not now, some day.

A Maine dairyman has said that next to a dead dog a coat of white-wash was most needed on dairy farms. Whitewashing adds to the sense of cleanliness as well as to its actuality; and it serves to prompt a man to better practice.

BETTER PRODUCTS.

Milk.—One Indian summer day in the middle of last November, coming north from a meeting of chemists at Washington. I stopped off at Newark, N. J., and went by trolley car a dozen miles to see a herd of 600 cows which made milk for the city trade. On arrival I was shown into the dairy room. In due time a bell rung and I went across to one of the barns. The milkers came in from the fields. Every man took off his soiled clothes, washed his face, hands and hair most thoroughly, cleaned his nails, using a scrubbing brush, put on a white duck suit which had been steamed and boiled that morning to cleanse it. These men, having dressed with more care than most men dress for the parlor, took steamed and sterilized milk pails and went upstairs into the cow parlor. The cows were bedded well and carefully cared for. The manure was frequently removed from the barn into the cellar below. A file of a dozen milkers marched down one of the long alleys, almost with the precision of a military company, and began milking. A barn man had preceded them, had got the cows up, and had brushed off bellies, flanks and udders. The milk was milked into strained pails. Every effort was

made to get that milk in the very best condition possible. As soon as a man finished milking a cow he took the milk to the end of a long alley. It was strained through several thicknesses of cotton and sent off on an overhead trolley an eighth of a mile to the dairy room. There everything is kept absolutely clean by the use of live steam and much elbow grease. The milk was immediately cooled, and I had within fifteen minutes from the time it was in the cow's udder a glass of ice cold milk to drink—the most delicious milk I ever tasted. This milk sells for 12 cents a quart and the 600 cows do not make enough to meet the demand.

Mr. H. B. Gurler of DeKalb, Ill., the first instructor in our dairy school, makes milk for Chicago trade in much the same way. He sent milk to the Paris Exposition last fall. It goes there in perfectly sweet condition and showed no traces of souring until it was almost four weeks old. It had been neither heated nor preserved by any of the many devilish chemical nostrums now on the market. It was simply clean milk, and it kept thus long simply because it was clean.

Butter.—The milkman has no use for bacteria. The butter maker has, but he wants the right kind. The ripening of cream is caused by the growth within the cream of these little plants. There are good and bad plants of this minute kind as there are of the larger kind. The ill odors in milk and butter are often caused by bad bacteria.

Most butter is made by haphazard ripening, and usually either the good or the indifferent forms of bacterial growth predominate over those which cause trouble. In order to make this matter more certain, certain ferments are now used for this purpose. Their use should tend to greater uniformity of product. The milk or cream may or may not be pasteurized before their use. Brewers use regularly the same ferment in their vats; our wives when making bread use the identical form of yeast each day. Why not the butter makers?

Cheese.—Cheese making is more complicated than butter making. The sundry fancy cheeses owe their distinctiveness in large measure to the ferments—bacterial or mould-like—with which the curd is pervaded. They were never better made than they are to-day, and this condition is largely the result of careful investigation.

Sundry products.—Casein, dried milk, dried skim milk, milk sugar, condensed milk, albumen (egg powder) are on the market. Milk, butter and cheese are no longer a dairy tried without rivals. A multitude of products and by-products are being made from milk, and the end is not yet. The twentieth century cow seems fair to be a producer of a hundred rather than of three products.

BETTER SOLD.

This is a most important link in the chain. It were of little avail to put time, thought, labor and money into the improvement of the

herd and its product if no monetary advantage accrued. The betterment of the herd can hardly fail to entail an increased income. Not so of the milk, however. Such of you as can market your own products may find it so. But those who have to pool an extra clean, sweet milk at a creamery with that made under uncleanly conditions have little reward other than an approving conscience for their pains. To such I would say keep at it; the time is coming when virtue will have a reward other than itself. The alkaline tablet test, the curd test, the nose test, the fermentation test, poor butter and stiffer backbones in the operators' backs will all help to hasten the day of cleaner creamery milk, and of premiums for those who bring it and demerits for those who do not. Make the best and cleanest milk you can afford to produce, put brains into the operation, put milk, butter, or cheese in attractive shape, get your products known and the likelihood of success will be enhanced.

III. NEW NOTIONS.

Prophecies are cheap and are generally worth what they cost. One need not fear, however, that his prophetic hens will come home to roost if he is careful to date his ideas far enough ahead. So I will say that in 1950 such and such will be the vogue as regards milk making.

MILK MAKING.

In 1950 cows will be milked by machinery and fed rations we now do not dream of. Their numbers may not be increased, but their abilities will be vastly augmented. Only the best will be used, for behold, the problem which has vexed the ages, the production of either sex as desired, will have been solved. From the surplus of females the best only need be kept—the survival of the fittest. Electricity or some other of the wonderful forces as yet but partly understood will render sanitation and cleanliness easier, cheaper and more certainly effectual. The immunizing theory will have been worked out to its logical conclusion, and all cattle in their early calfhood will be vaccinated—to use a common term—with the sundry toxins, etc., enabling them to resist all disease. I shall mightily miss my guess if means of localizing and killing bacteria within living tissues be not developed. Thus may disease in human and in brute creation be attacked in three different ways, prevented by inoculation, cured by medication, and best of all, eradicated by better methods and a better popular appreciation of them.

And as for the men, as I said at the outset, there will be a new generation. Let it be our work and our pride to give these little folks the best chance. Let us not be like the dwellers in the Azores of whom it is said that they pray ever to be spared the impiety of wishing to know more than did their fathers.

MILK SELLING.

Frozen milk and dried milk which will stay frozen or dried and keep indefinitely will be the common forms in which milk and cream will be sold some day, and each and every dairyman—or some central station for them—will freeze or dry the milk. The immense amount of energy and money spent in transporting dilute products will be incidents of the past. Edison has made millions from concentrating low grade iron ores. Milk will be concentrated some day. Freezing and drying will be done by the use respectively of liquid air and of the stored heat of the sun's rays, or, perhaps, the heat of the interior of the earth. Milk thus dried will be sterile; being dried in a vacuum, its albumen will not be so much coagulated as to lessen its digestibility.

BUTTER AND CHEESE.

Butter will be ripened artificially and in no other way. The products of fermentation rather than the ferments themselves will be used, and a sweet, cream butter, flavored as a housewife would flavor a cake with an essence, of a uniform character will result.

Cheese will not be thus flavored, since its ripening is due to other causes and needs slow development. I look for a change here more particularly in the greater appreciation of the dietetic value of the article by the people and its larger use.

Do these notions sound irrational and impossible? What would our fathers have said of a prophet who, in 1850, had predicted that at the close of the nineteenth century their children would flash New Year's greetings under the ocean from Europe to America; that their sons in New York would whisper soft nothings to their sweethearts in San Francisco; that they would send messages on invisible waves of the air to ships far out of sight at sea and through intervening mountains; that their houses would be warmed and illuminated by the lightning, and that they would travel on the thunderbolt; that they would harness Niagara as a horse, and that its power would do mighty work afar off; that they would look through the human body as through a window, and that they would open the abdomen, perform incredible surgical operations therein without pain and without danger? Would his prophecies have passed current? And yet he would but have predicted such commonplaces of to-day as the ocean cable, the telephone, wireless telegraphy, electrical lighting, heating and power transmission, the X and kindred rays and anti-septic surgery.

Many of the prophecies for 1950 are bound to come true before that date. The logic of events will compel them. Let us be ready for them when they come. Our great duty today, however, seems to me to be to make the best of our present knowledge and opportunities.

I have already voiced my appreciation of the lack of encouragement many farmers have to do better. But better cows are possible, better feeding and care are practicable, and both will pay. Better and cleaner milk may not bring larger returns now, but it ought to and will some day. If we but resolve to better our practice so far as in us lies, and make good our resolutions, our example will be helpful in others, twentieth century milk making will be just that much further advanced towards perfection, and that great earthly goal towards which we should all strive will be in some measure attained—the world will be the better because we have lived in it.

DISCUSSION.

Mr. Galbraith: I would like to ask if the benighted individuals of the south-western section of the State spoken of by Professor Hills, read dairy papers?

A. I do not believe that they do; if so, they probably read with their eyes shut. I consider the dairy paper one of the strongest helps to the dairy interests that we have.

Mr. Galbraith: I am glad to hear Professor Hills' remark in regard to the dairy papers. I read every paper of this kind of any value.

Q. I would like to ask what kind of a stable floor Professor Hills considers the most cleanly.

A. The cement floor is perhaps, all things considered, the most cleanly, but it has the disadvantage of being cold. In Vermont the plank floors are generally used, the gutters being made of cement, asphalt or plank.

FIRST DAY—EVENING SESSION.

SOME ESSENTIALS OF SUCCESS IN BREEDING DAIRY CATTLE.

By E. H. SIBLEY, *Manager, Miller & Sibley's Stock Farm, Franklin, Pa.*

The science of breeding is a complex and difficult one. Nature does not trumpet forth her teachings from the house tops, nor does she even whisper her wisdom to every careless passerby. Her precious truths are imparted only a few at a time, and to only the diligent and patient inquirer.

In the half hour allotted to me for the discussion of this comprehensive subject, I cannot hope to do more than to make a mere outline sketch. Moreover, I do not pose as an authority. My experience has been confined almost exclusively to the breeding of Jersey cattle; but I trust that I may glean some facts which shall

have some practical value, and prove helpful to those engaged in breeding any of the dairy breeds.

All will agree that the selection of a bull is the most weighty responsibility that any breeder is called upon to assume. It cannot be too often repeated and emphasized that the bull is half the herd. The successful sire must have health, constitution and vigor. A mellow skin of medium thickness, soft hair and large bright eyes, short legs, wide hips and a quiet disposition are desirable qualities as far as they go. I attach no importance whatever either to the es-cutecheon or to the rudimentary tests. Size of frame is often associated with vigor, and a strong head tells the story of abundance of nerve force, which is so important a characteristic of all great sires. Shapeliness and symmetry are not to be overlooked, but every suggestion of femininity is to be avoided. Therefore, we like a thick horn and good bone substance rather than the opposite. Length of body and depth of barrel are gauges of lung and digestive quality. Sloping shoulders, thin thighs and angularity rather than roundness of body are prized as outward signs of the dairy, as distinguished from the beef type. But the prudent breeder will demand much more in a bull than the points named. He will first of all require that the animal be tuberculin tested, and pronounced sound by some competent and reliable veterinarian.

The individuality, record and pedigree of both sire and dam will also receive the most careful attention. A man who will use a bull whose dam is lacking in constitution, or having a defective udder, or short, badly placed teats, or whose capacity for milk and butter is small, will never make a success as a breeder of dairy stock, and may count himself lucky if he does not spend his last days in the poor house. Great cows may derive their excellence from their sire, and thus have dams of only ordinary merit, but I have never seen a great bull from a poor dam and I never expect to. Furthermore, I should want the sire of my bull to have daughters with excellent records for milk and butter, or himself to be from a dam with a superior record.

I should never select a bull, both of whose parents were old at the time he was dropped. I have examined the records in the last volume issued by the American Jersey Cattle Club and I find that of thirty-five bulls having twelve or more daughters each that have made over fourteen pounds of butter apiece a week, only three were from a sire and dam averaging over ten years at the time they were dropped. The average age of the parents of the thirty-five was six years. Of the thirteen bulls credited with twenty or more daughters with butter records of over fourteen pounds a week, only one has an average age of the parents at the time of his birth of over ten years. In this connection I wish to refer to four sons of the famous cow

Eurotas, who many years ago made 778 pounds 1 ounce of butter in 341 days and dropped a living calf 359 from the beginning of the test. The sons to which I call your attention are Duke of Darlington, Pedro, Michael Angelo and Eurotas Black Prince. Duke of Darlington and Pedro were dropped before their dam was seven. Their sires were young. Duke of Darlington has twelve standard tested daughters and Pedro over thirty. Michael Angelo and Eurotas Black Prince were dropped when their dam was over eleven, and their sire was also an old bull. Michael Angelo has two tested daughters and Eurotas Black Prince none.

Having purchased a good bull, it may not be out of place to consider next how to care for him. To allow him to run with the herd, generally results in his becoming worn out or unmanageable by the time he is six years old. To confine him in a stable without exercise is cruel, tends to make him an uncertain breeder, and also dangerous to handle. He should be treated firmly, but gently, and should be given daily exercise in the open air. By such means Stoke Pogis 5th and Ida's Rioter of St. L. were kept by us in a good condition of health and vigor till their fifteenth year. If I had a bull of great dairy merit, still strong and potent, but advanced in years, I should take care that the cows with which he was mated should be much younger than himself so as to insure a full stock of strength and vitality in the produce.

This leads me to call your attention still further to what I consider the importance of keeping low the average age of the sire and dam, if one would secure cows of the greatest capacity for milk and butter. Taking fifty of the foremost cows in the Jersey breed, as shown by milk and butter records accepted by the American Jersey Cattle Club, particulars of which are given in the last published volume, I find the average age of the sire and dam at the time they were dropped to be approximately four years. Included in this number and average are the widely known cows Eurotas, Jersey Belle of Scituate, Mary Anne of St. Lambert, Ida of St. Lambert, Etheel 2nd, Landseer's Fancy, Adelaide of St. Lambert, Signal's Lily Flag, Eurotisama, Ida Marigold, Brown Bessie, Merry Maiden, Matilda 4th, Baroness Argyle, Hugo's Countess and thirty-five others hardly less illustrious. Of cows that have produced three or more daughters with standard butter tests, I find eighty-nine concerning which sufficient facts were given to enable me to determine the average age of the sire and dam at the time of their birth. This I ascertain to be approximately four and one-half years. Only two out of the entire number average over ten years. Only one additional averaged over nine, and only two additional over eight. Those who purchase old cows in the hope of obtaining superior offspring from them, need, in my judgment, to heed these figures and by the use of

a young sire keep down the average of the two parents, if they would see their hopes realized.

The process of improving the herd is necessarily a slow one, but in no other way can it be so cheaply and quickly brought about as by the use of a bull of marked excellence both in breeding and in individuality. Of course, it is desirable to have females of the best dairy type and capacity to mate with one's bull, but this is not always feasible. For those who having a bull possessed of the needful qualities, are compelled through limited means to be content with foundation cows of only medium excellence, there is much encouragement in the facts disclosed by the record of the thirty-fifth leading dairy bulls as given in the published records of the American Jersey Cattle Club. Taking the highest tested daughter of each of these bulls, I find that more than one-half of them are from untested dams.

Although a subject over which many a hard fought battle has been waged, I think it due that we should give our attention for a few minutes to the subject of inbreeding. First of all, it will not be disputed, I think, that in order to justify close inbreeding there should be present in the animals certain very valuable qualities which are worthy of being intensified. It should be borne in mind that inbreeding accentuates bad points, if there are any, as well as good ones. We may note, however, in passing, that breeding together any two animals having a common weakness, whether those animals be related or not, will tend to increase that weakness. It is because animals of similar blood lines are more likely to be similarly affected that those who practice inbreeding need to be ever on their guard. Furthermore, among the great number who have tried close inbreeding, only a few great geniuses have made a pronounced success. Even these geniuses have recognized in the course of time the necessity for an outcross in order to maintain the fertility and capacity of their animals. Two families of Jerseys, once famous but that one no longer hears much about, the Alpheas and St. Heliers were closely inbred. The firm of Miller & Sibley once owned two St. Helier bulls that were inbred for many generations to St. Helier forty-five. One of them, Vicar of Wakefield, had $87\frac{1}{2}$ per cent. of his blood and the other, King St. Helier, $78\frac{1}{8}$ per cent. and the latter bull traced fourteen times to St. Helier forty-five within six generations. While there is no doubt that there was great butter capacity in the early generations of the descendants of St. Helier forty-five, yet both of these bulls possessing such a large per cent. of his blood were complete failures as sires. Neither of them has a standard test daughter, and King of St. Helier, though bought by us when a calf and given every advantage, never sired over half a dozen calves that had vitality enough to carry them to maturity, to say nothing about the question of superiority.

Along with other breeders who have had considerable experience, Miller & Sibley have had marked success with a number of inbred animals. It is possible that some few facts in regard to the pedigrees of these animals may be instructive. The Jersey cow, Adelaide of St. Lambert, that gave for Miller & Sibley over one ton of milk in a month, thus winning the world's Jersey championship, is four times descended from Stoke Pogis 3rd within five generations and has seventy-five per cent. of the blood of the so-called St. Lambert family. But of marked significance, as it seems to me, is the fact that her maternal grandsire, though not in himself a great dairy sire, has at least the negative virtue of a totally different lineage, and contributed twenty-five per cent. of her blood. In view of the breeding of this cow, and of many others that could have been instanced, and bearing in mind the history of the Alpheas and St. Heliers, the question suggests itself whether it would not be well for those who are concentrating all their energies on breeding "pure St. Lamberts" to make now and then a judicious outcross, and thus achieve greater results than heretofore, not to mention preserving the excellence the family already has.

The bull Ida's Rioter of St. L. owned by Miller & Sibley until his fifteenth year, leads all other bulls in the Jersey breed, as is well known, in the average amount of butter yield for thirty-three tested daughters. This bull was a grandson and great grandson of Stoke Pogis 3d and with no outcross of blood on either the sire's side or dam's from the so-called St. Lambert family. Yet of his two highest tested daughters one of them had so little blood on the dam's side that was found on the sire's that it is hardly worth mentioning; and the other had not one drop of blood through her dam in common with that of her sire. The animal I am now referring to is no other than Ida Marigold, who won at the World's Fair four important prizes, two of them being in practical contests and two in the showing, and one of each being a sweepstakes. Another great cow owned at Prospect Hill Stock Farm was La Petite Mere 2d, who for many years led all other cows in the Jersey breed for a yearly production of milk. It is true that she was both a daughter and a granddaughter of Stoke Pogis 1259, Imp., and that he, in turn, was both a son and a grandson of Young Rioter 751, English Herd Book; but alongside of this great success for inbreeding let us set Matilda 4th, merely a daughter of Stoke Pogis 1259, Imp. She was owned by us at the same time that we owned La Petite Mere 2d. Matilda 4th gave more milk by the day and week, and would have given more by the year if she had begun the twelve months record at the same time as the other cow, so that she too might have had the benefit of grass in the spring to keep up her flow during the last few months. Furthermore, her butter capacity was about one-third greater than that of La Petite Mere 2d.

Out of one hundred cows with the largest butter records in the Jersey breed whose pedigrees I have examined, I should say that only ten could be classed as closely inbred. It is evident from this hasty survey of the situation that in the Jersey breed, and I presume the same is true in most other dairy breeds, there is much vigor and excellence already attained that it is not necessary to resort to continued close inbreeding in order to secure great dairy animals. Before passing to the consideration of other phases of our general subject, it may be well to call attention to the fact that many of the bulls and cows strong in the blood of any particular family, produce when mated with animals strong in the blood of some other good family, animals of greater merit than when mated with animals of their own family. When the produce is much superior to the parents it is often said to be due to "a happy nick." This is merely a convenient phrase for indicating our ignorance of the real causes.

Now that we have got past the rock of inbreeding, our further sailing on this subject should be in waters where all are agreed as to the proper course.

When a breeder purchases cows for foundation stock he will always demand three points, individuality, performance and pedigree. Cows with fleshy udders, or small udders, or poor fore udders, or small teats are to be avoided as are those also that have short and heavy bull-like necks. The model udder reaches well forward in a graceful curve, and extends high up behind. Many beginners make the mistake of supposing that those animals are of a superior type that are dainty and delicate, and lacking in size. As a matter of fact, slender, graceful animals are likely to be efficient in vigor and to prove disappointing.

The performance of an animal is one of the best gauges of her value. The average man cannot afford to buy world beaters, but he will do well to pay the additional price which is asked for superior as compared with inferior performers. The record of the animal to a large extent fixes the value.

Some people ignore pedigree and others make a fetish of it. The truth, as usual, lies between the two extremes. The rule should be to buy a good animal with a good pedigree. Either one, without the other, leaves something to be desired. Like does not always produce like. Sometimes it produces a likeness to some ancestor. There is more probability of maintaining in the produce a certain degree of excellence if the ancestors for some generations have been possessed of it.

It will be generally conceded that the breeder of dairy stock who expects success should subscribe for and read diligently some first class journal devoted to his speciality. He will also watch for the reports of experiments made with so much learning skill and care at

the Agricultural Experiment Stations and put in practice the recommendations they contain. The dairymen of Pennsylvania owe a heavy debt of gratitude to such able workers in their behalf as Professors Armsby, Hayward and their associates of the Pennsylvania State College.

Perhaps there is no one thing which will so well repay the breeder of dairy cattle for his time and trouble as that of keeping an accurate account of each cow's production of milk and butter fat. It is not a complex or difficult matter. Have a spring balance in the stable, and weigh on it each cow's mess as soon as milked; set the amount opposite the cow's name on a sheet ruled for a month; give each cow a separate page in a blank book, and transfer to it her total production month by month. At the end of the year, the record will show which cows are earning money for their owner, and which losing it. The quality of milk from time to time may be tested by the Babcock test or by separate churning. Unprofitable animals should be promptly sold for beef.

"Cleanliness is next to godliness," says the old proverb, and of so much importance do I consider it in dairy breeding that I class it as one of the fundamentals of success. Filth and disease always go linked arm in arm.

An abundance of light and air in the stable will pay big dividends on the investment. Sunshine in itself is a grand disinfectant and tonic, while the value of pure air is simply inestimable.

The most widely prevailing scourge among dairy cattle is tuberculosis. In its early stages there is no external means of detecting its presence. The Koch test is searching and accurate. No animal should be purchased which has not received, and successfully stood the test. Furthermore, the prudent breeder will have his herd tested every year or so, even if he has no reasons for supposing that it contains any diseased animals. As a citizen of Pennsylvania, I feel proud of the work done towards exterminating tuberculosis under the wise leadership of Dr. Leonard Pearson.

Dairy animals like human beings require a certain amount of daily exercise for their best development. The fond mother who shuts her child up in a warm house and keeps him there during the long winter months, is doing him an injury instead of a kindness; and the dairyman who neglects to give his cows half an hour's exercise every day in the open air in winter, will in my judgment, pay dearly for his error.

There are many cows in the Jersey breed in every herd that if allowed so to do would milk from calving to calving. To permit them to do so it is to let the copper cent hide the gold dollar. The vitality of the cows and their offspring is lessened; hence, their capacity is reduced, and they are rendered more likely to fall a prey to the at-

tacks of disease. Every cow should be dried off two months before calving.

Finally, cattle in order to maintain their condition and pass on their good qualities to their descendants should receive individual attention and be given a generous amount of properly balanced rations. "Out of nothing, nothing comes," is as applicable to the breeding of dairy cattle, as anywhere else. Those who expect to produce superior cattle through scant food and indifferent care should be logical, apply their theory to the human family and claim also that the best type of citizens and the great men of the nation proceed from the half-housed, half-clothed and half-starved waifs of the big cities. Most people, however, hold to the opinion that such are not favorable conditions in which to rear the strong, the just, the wise and the uplifting elements of society. Those who champion the starving theory will have difficulty in convincing the public of the correctness of their views. The dictates of commonsense, the facts of experience and the teachings of history all unite to give the weight of their testimony in favor of homes, whether of mechanics, professional men or farmers, where the boys and girls can have sufficient and proper food, with comfortable shelter and good care.

DISCUSSION.

Mr. W. H. Comfort: I would like to ask how a great number of dry cows are secured in a few months.

Mr. Sibley: I said in the beginning of my paper that I do not pose as an authority and I do not claim that I can answer all the questions that have been puzzling people for hundreds of years. I will, however, say this much, that we can do a great deal more toward drying off the cows than if we let them go. If it were summer time and the cows were out on grass I would take them off and dry feed them. Sometimes it is necessary to give them medicines. I believe that the old fashioned dose of salts will have effect in that direction. We all know too that irregular feeding will tend to this result.

Mr. McSparran: The speaker mentions that among cows to be avoided are those with fleshy udder. It is taught by some that such cows give a higher per cent. of butter fat than cows with the loose udder that milks out like a rag. I would like to ask Mr. Sibley's experience.

Mr. Sibley: I cannot say that we have kept sufficiently accurate records to have our experience very valuable on that point. I think, however, that when we get the per cent. of butter fat we should bear in mind the total amount the cow is giving. If giving a small amount of milk the high per cent. of butter fat does not mean much. I have seen people "hoo-dooed" by a high percentage of butter fat

but a very small amount of milk was present. We have been engaged in breeding for about twenty years, and I have never known a cow with fleshy udder that I considered a valuable dairy cow. That is not alone my experience, but the experience of the examiner for the Holstein Registry. He came to our herd and instead of asking us to tell him about the cattle, said he would pick them out and if he made any mistake he would consult us. He picked out two ear-loads and I was delighted with the selection with the exception of one cow with a fleshy udder. After the selection was completed he went through them again, and the very first one cast out was the one with the fleshy udder.

SECOND DAY—MORNING SESSION.

WHAT MAKES THE MILK AND CREAM TESTS VARY SO?

JOSEPH L. HILLS, *Director Vermont Agricultural Experiment Station, Burlington, Vt.*

This is I presume a burning question in Pennsylvania as it is in Vermont. It is perhaps, not quite as important an issue since your State is not as thickly studded over with creameries and cheese factories as is the Green Mountain Commonwealth, which contains within its borders over 250 separate concerns, or, counting skimming stations, nearly 350 places where co-operative dairying is in vogue. At over 300 of these, milk and cream are bought and paid for by test, and at every one of these there is abundant querying as to the variations which appear in milk testing. What makes the milk and cream tests vary so? Doubtless the patrons of your creameries are asking the same question. I cannot hope to absolve all their doubts, but perhaps I may be able to throw some light upon the subject and help to make better feeling between creamery managements and their patrons. Some of the matters I shall mention may have little or no pertinence in Pennsylvania owing to the differences in the methods in the two States.

Let us consider this matter under three heads:

I. Why does the milk or cream furnished by different patrons vary in test?

II. Why does the milk or cream furnished by the same patron when taken to different creameries vary in test?

III. Why does the milk or cream furnished by the same patron, at the same creamery, vary one week with another, and one month with another; why does not the quality remain unchanged?

I. VARIATIONS IN TESTS BETWEEN INDIVIDUAL PATRONS.

1st. Why does Smith's milk or cream test differ from that of Jones'? Differences of breed, individuality, food, nervous excitement, environment, weather, the stage of lactation, and the management of the creaming devices may influence the result. Let us sketch some of these.

BREED.

Every observing dairyman appreciates that differences in cattle, due to the character of their breeding, are such that some cows give richer milk than others. The Channel Island cows have been bred through many scores of years with a specific purpose in view, to make a high grade milk; and, on the other hand, the cattle of Holland and Scotland have been bred generation after generation more particularly to make a large quantity of milk. While there are exceptions to every rule, still, speaking broadly, Jerseys and Guernseys give richer milk, than do cows of other breeds. Smith's test outranks Jones' because long lines of breeding with a definite aim in view have implanted in his animals a tendency toward making a better grade of milk than can Jones' cows.

INDIVIDUALITY.

While the differences in breed are frequently concerned in the test variations as between one patron and another, the individuality of the animal is often quite as important. There are families within breeds. The cows of some families give relatively rich milk, and others in other families relatively poor milk. The type of cow and the relationship of the performance is all important. As nothing here is differently built than a dissimilar, the conformation of the cows to that type which long years of efficiency has produced is a measurable factor in the estimation of breeding work.

FOOD.

He who looks to food to grade up the quality of milk looks in vain. Food variations may increase the quantity of milk but seldom if ever bring about permanent changes in quality. If a cow is fed a very scant ration she may alter more or less the quality of milk given; but when a cow is changed from a good, palatable, plentiful ration to another of similar grade, but differently made up, no material change in the quality of the milk is likely to follow, provided the rations are normal. We have been trying for years at our station to persuade cows to change the quality of their milk, but at no time and in no way have we brought about a permanent change. When we have fed fat (vegetable oils, like corn cottonseed, linseed and palm oils, etc.), to the cow we have changed the quality of the

milk to a slight extent; but we have hurt the quality of the butter far more than we have helped the fat percentage.

No Holstein cow can be wheedled into giving Jersey milk by any normal rational feeding, unless it be by semi-starvation. A starving or half-fed cow is apt to make richer milk as a consequence of her ill treatment—but far less of it.

NERVOUS EXCITEMENT.

Such conditions as may be provocative of nervousness have more influence upon the quality of milk than most people are apt to think. I once heard a Maine dairyman say that in his judgment the best thing on a dairy farm was a dead dog, and that a coat of whitewash in the barn was a close second to it. A dog once thoroughly killed never again dogs cows, and thus one of the most common sources of bovine agitation is removed. Milk making is a nervous function and in proportion as a cow becomes excited, in proportion as the nerve force which should be concentrated upon milk making, is distracted therefrom by any cause, dogging, horn-flies, abuse, noise, etc., in that proportion there is likelihood—almost certainty—that the milk flow will be influenced. If I remember right Gov. Hoard tried a few years ago an experiment in this line. I believe he was the first man to urge that a cow be treated as if she was a lady; but once upon a time he abused a cow in order to know whether or not it would affect the quality of the milk. The cow was milked about half through and a sample of the latter portion of the milk was set aside; then a heavy pin was raked across her flank. She made a jump into the manger and was greatly excited. The milking was then finished and a sample taken. There was a difference of fifteen per cent. in the amount of butter fat in the two halves of the milk, a difference of fifteen per cent. in the amount of fat eliminated by the nervous equation.

Another experiment in the same line: One of our western experimenters fired blank cartridges in front of the cows immediately before milking. The explosions decidedly affected the quality of the milk. In our own experience an Ayrshire, temporarily in new and noisy surroundings, increased the quality of the milk without decreasing the flow, while another Ayrshire at the same time, treated in exactly the same manner, did precisely the reverse and shrank half in quality and a quarter in quantity. Anything that tends to make a cow nervously excited will be apt to affect the milking function, as a rule, unfavorably.

Why should we expect a cow or herd of cows always to give, week after-week, the same quality of milk? Milk making is the cow's work, just as agricultural investigation and teaching and executive duties are my work, and the sundry farming operations, your work.

Do we always work as well one day as another whether we feel well or ill? Though in the best of health do we do the same amount of work each day? Why should we expect a cow to do the same day after day? Her work is expressed by the milk she makes, and, largely, by the per cent. of fat she puts into that milk. We should not expect of her what we ourselves cannot do.

STATE OF LACTATION.

The stage of lactation is another reason why Smith's milk test differs from that of Jones'. It is well known that cows tend to better the quality of their milk as they progress in lactation. Investigation has shown that cows differ greatly in this matter. Some vary but slightly and others largely as they pass from freshness to stripping. A farrow cow goes dry giving milk but little richer when she came in; a pregnant cow going dry usually gives considerably richer milk than when she came in. Experiment has shown, moreover, that on the average the increase from calving to drying-off approximates 1.25 per cent. fat, that is to say a milk testing four per cent. at calving may test 5.25 per cent. of fat at stripping. Smith's milk may be made largely by strippers, while Jones' cows may be mostly fresh in milk.

It is now generally understood that the quality of the milk of the same herd varies decidedly from day to day, from milking to milking, and that, in order to represent correctly the weekly or monthly quality, it is necessary to take a composite sample. It will sometimes happen, however, that even when composite samples are used tests may vary one week with another, fifty, sixty, or seventy points. I believe it is the duty of the creamery management in such case to verify the result by retest. Many patrons have an exaggerated idea as to this matter. For instance, a few years ago a creamery patron told me that he was being defrauded, that his test at the creamery one month was 3.90 and the next month 3.85. These five points, 0.05 per cent., seemed to him enormous. No operator can take the same test in the same Babcock bottle and always read it twice alike. Two-tenths of one per cent. is not a wide difference between two tests, and three-tenths of one per cent. as between one month and another, even when the cows are in scant flow, is hardly a wide enough variation for cavil; more than that is of importance. But, as I shall say later on, one should not growl but investigate.

MANAGEMENT OF THE CREAMING DEVICES.

Milk is creamed nowadays either by shallow setting, deep setting or centrifugal means. The former old-styled and inadequate method is not followed in co-operative dairying and may be dismissed from

further consideration here. Deep-setting systems vary somewhat in character and efficiency. Smith may use a form capable of doing good work when conditions favor, and he may run it well. Jones may have a so called dilution separator—sometimes, and well-called, a delusion separator—and get quite likely a richer cream than Smith as a consequence, but a good deal less of it. Or one may have a centrifugal separator and the other, none; or both may have the same device and handle it in different manners.

Many of the items already referred to affect cream as well as milk tests. Breed, individuality, lactation changes, etc., play their part here. The term "Jersey Cream" is usually held to be a synonym for richness. As a matter of fact, Jersey milk properly creamed in a deep-setting device is apt to make thinner cream than does the milk of other breeds containing smaller fat globules. In general, milk containing relatively small fat globules creams less thoroughly than that containing larger ones, but such cream as is thrown up is usually denser and richer. On this account as well as because of its well-known greater richness, stripper milk is apt to make a richer deep-setting cream than does new milk.

II. VARIATIONS IN TESTS BETWEEN CREAMERIES.

Why should Smith's milk or cream taken this week to Brown's creamery and next week to Robinson's creamery test differently?

I presume this is seldom done in this State. It is a common practice in Vermont; but it is an unwise procedure, since it accomplishes nothing.

When we go to bed at night we breathe a prayer in which are to be found the words "Lead us not into temptation." Human nature is so constituted that it often happens that a patron, who takes his milk or cream from Brown's creamery to Robinson's, is essentially leading the latter into temptation, into which he is apt to fall. He may feel inclined to raise the test, to make it read, or to report its reading, higher than it really is. In my judgment such a test is not a test of the milk, but of human nature; and the milk of human kindness is altogether too apt to be curdled by such a trial, as is the milk of the cow by the sulphuric acid of the Babcock method. Such a comparison has no standing and means nothing. There are better ways whereby one may find out whether Brown's work at the creamery is correct or is not correct. One may help himself or be advised by the experiment station.

HOW TO CHECK THE CORRECTNESS OF CREAMERY TESTING.

I believe that a Babcock apparatus should be located in every dairy community; and that there should be there, also, some young man or woman capable of running it in a satisfactory manner, whose

services could be had by any one in the community at a small consideration. I do not advocate that all dairymen own Babcock apparatus. Some farmers are not fitted to run it properly. A Babcock incorrectly run is worse than none at all, since the results are more misleading than instructive. If the test apparatus and some man or woman who is careful and capable of running it are available, one may know, if he wishes to, whether his creamery is doing him justice or not.

If the community is unwilling to combine in this way, its dairymen may turn to the experiment station, an institution which is helpful to hundreds of dairymen in the State in this very way. It is a common thing up our way for Smith, who doubts whether Brown's test is correctly or honestly made, to take a sample and express it to the experiment station; and then if its test differs from Brown's there is music in the air.

You will ask, perhaps, how the station knows that the sample that Smith sends has not been tampered with. If Smith is a rogue, if for any reason he is bound to make his creamery wrong, whether or no, it is easy for him to manipulate the sample. So can Brown tamper with samples. Yet if the men are sincere and anxious to know the truth, there are ways in which they can insure accuracy. Some little time ago the Vermont station put out a four page bulletin—reprinted at the end of this article—giving methods of sampling milk and cream. This has been printed in poster form and was sent in the spring of 1900 to every Vermont creamery and cheese factory with the request that it be posted near the weigh can. We give three schemes for sampling milk or cream whereby the patron who desires to check the testing work of the creamery may do so; first, the creamery sample may be halved, second, the creamery man may be required to take duplicate samples, and, third a patron may take his sample for himself. Neither of these methods of sampling will ensure absolute accuracy. Errors of omission or commission, of ignorance or intent, may be made. If the creamery samples be halved, if Brown is asked to furnish half of it that it may be sent to the station, it is located, prior to halving, in the control of one of the interested parties, the creamery man; and if he is inclined he may tamper with the sample instead of with the result. If the second method is used, if every time Brown's operative puts a gill of milk or a measure of cream into his sample jar he puts one into the jar which the patron holds, the objection may be urged that the sample is in the hands of the other interested party, the patron. If the dairyman takes his own sample at home, he may be ill informed as to the necessary precautions in sampling, or careless, or, indeed, intentionally deceitful, and the sample be not truly representative. In short there is no way in which the experiment station can be cer-

tain that the samples sent it are correctly taken. Hence we are careful in our reports to those sending us samples to disclaim all responsibility as to the accuracy of sample taking. I think, however, that the bulletin to which I have referred, which was sent to be posted at every creamery and cheese factory in Vermont, which was mailed by thousands throughout our State to the station mailing list, and which concludes this article, does help to make the samples that come to us more uniform and trustworthy.

III. VARIATION IN TESTS WITHIN THE SAME HERD.

Why is it that Smith's milk or cream taken to Brown's creamery varies one month with another? Why does it not test evenly?

Several of the reasons cited under the first head apply here.

LACTATION CHANGES.

The change in lactation of the cows is one important reason why there should be variation. The general tendency of the herd will be as the cows go along in lactation to give somewhat richer milk. While there are many exceptions, the general rule is that cows coming in in the spring will give a fairly even grade of milk for the first five months in their lactation, and then increase in quality until they go dry. If they are farrow cows, quality changes but little as time goes on. If an all-the-year-round dairy is kept there should be less change on this account.

These same changes pertain to the cream. The richer milk is apt to make richer cream for reasons hitherto pointed out, if it is handled by a deep-setting device. Centrifugal separators, however, are no respecters of rich or of poor milks. A rich cream may be made from one and a poor cream from the other, according to the setting of the cream-screw or regulating device. If, however, this remains unaltered and the same proportion of milk is taken as cream from the rich and from the thin milk, creams will vary accordingly.

For example, if one dairyman has 1,000 pounds of new milk testing 3 per cent., and the other, 1,000 pounds of stripper milk, testing 5 per cent. and each takes 100 pounds cream and 900 pounds skim milk, the former would have a cream testing nearly 30 per cent. and the latter, one containing approximately 50 per cent. fat.

WEATHER.

Stress of weather is another cause of variation. We have given much time at the Vermont station to the study of the effect of temperature upon the milk-flow. Our results indicate that the quality of a cow's milk alters inversely to temperature changes. When the temperature rises the tendency is for the quality of the milk to drop; when the temperature falls the tendency is for the quality of the milk

to rise. There are, however, many exceptions to this rule. No attempt has been made to test this matter in long periods but only as to daily or weekly fluctuations.

SURROUNDINGS.

The environmental differences, the nervous excitement of the cow already mentioned, as they vary from time to time, may cause fluctuations in the quality of the cow's milk. The change from barn to pasture, or the reverse, lack of water, poor water, drying pastures, new milkers and the like, may and often do have influence. Then, too, it must be confessed that there sometimes occur fluctuations in the quality of the milk of a cow, and, occasionally, of a herd for a week or more, for which no rational explanation can be offered, changes which, because of care in sampling and testing and the conditions surrounding the operations, are removed beyond all likelihood of being due to error rather than to fact. There is much that we do not know about cow nature and cow doings in milk-making. And here, as ever, those who know the most are those who impute the least, while those less well informed are the more suspicious of wrong doing.

An editorial in a recent number of *Hoard's Dairyman* is very much to the point in this connection. It says:

"The cow is not a machine that will turn out the same quantity or quality of milk from day to day, and consequently the milk varies according to the physical and, perhaps, mental condition of the animal. The physical comfort or discomfort of the animal is reflected in the milk pail, and if the great mass of dairymen would only recognize this fact, it would have a beneficial effect on the state of the pocket book.

In a careful record of the yield of a herd of cows for several years the following facts were noted:

They varied in quality of milk from one milking to the next, and from day to day, the quality rising and falling without apparent cause. The changes were usually within 1 per cent. of fat, but one cow changed 2.68 per cent. in two days.

The average change during the period of lactation was 1.34 per cent., and the greatest change 2.78 per cent.

The above herd was exceptionally well taken care of and sheltered, and the changes in quality of milk were thus much less than would be noticed in cases of animals kept under less comfortable conditions.

The dairymen should remember that exposure to cold, drinking large quantities of cold water, exposure to cold rain, fright, worry, heat, flies, and dogs, walking several miles over poor pasture for food, starvation, soothing the cow with kicks or milking stool, will all remove fat from the milk and make such treatment more expensive than good shelter and kind treatment.

When a patron's milk shows a low test, let him make a careful examination of conditions at home before he lays the blame on the butter-maker or the test."

THE CREAMING DEVICES.

Actual variations in the management of the creaming devices, known or unknown to the operator, account to quite an extent for variations in the cream output. For the sake of convenience and clearness, let us consider the possibilities of variation in the deep setting and centrifugal methods each by itself. No pretense is made that all possible causes of variation are covered.

DEEP SETTING.

Temperature.—Completeness of deep-setting creaming is largely dependent upon the proper temperature of the water. The density of the cream is also affected by this factor. A warm water (45 degrees and upwards) means poorer creaming and less of a richer cream. Colder water means better creaming and a less dense cream.

Length of Setting.—The shorter the time, as a rule, the thinner the cream.

Delays in Setting.—Delays in setting are apt injuriously to affect creaming, and, perhaps, to modify the fat percentage.

Deep-setting creams from different sources may vary over quite a wide range, containing seldom, if ever, more than 25 per cent. fat, or less than 12 per cent. I have seen quite wide differences from day to day in the same herd with the same milk for which no adequate cause could be assigned.

SEPARATOR.

A good separator properly and uniformly run ought to turn out from milk of essentially even quality a cream of a practically unaltered character. But milks from day to day do change in their fat percentage, even though herds be of considerable size; and, consequently, creams vary accordingly. As a rule, however, one week with another, if no change occurs in the setting or the running of the mechanism, and barring the extreme changes of the latter part of the lactation, there should be only minor changes in fat percentages.

Changes in device for regulating thickness of cream.—All separators have means of controlling the proportions of the milk taken as cream and as skim milk. If in any way, accidental or intentional, the setting is changed, the quality of the cream is affected. Accidental changes often occur. The outlet becomes clogged, a hair lodges there, a chip or filing of steel, or a bit of curd or some speck of dirt gets in, the cream flow is retarded and its richness affected.

Incorrect running.—Too low or too high speed or feed, a trembling bowl, a machine ill cleansed, out of repair, or out of balance may and do affect results. I have known positive flaws to exist in the mechanism which modified results.

While not exactly germane to the subject I may be permitted, I trust, to say a word in answer to the very common question at meetings of this kind—What is the best separator?

This is one of the most common questions asked of the station. Our present feeling in the matter is that there is not, of necessity, any one make that is "best" in all points; that machine of all the more prominent makes are capable of doing a good grade of work when properly handled; that, since good skimming is the rule, other points, such as initial cost, durability, probable repair bills, ease of operation, etc., are now more important; and, finally, since flaws may occur in individual machines of any make, that agents' claims and records of other machines of the same make are of less value, touching the quality of skimming, than is the analysis of the skim milk of the individual machine offered. Many farmers in Vermont have bought separators on the condition that the skim milk should be submitted to the experiment station for analysis, purchase to follow its favorable, and rejection its unfavorable report. The buyer thus has, free of expense, the advantage of the advice of disinterested experts, which moreover, is given in ignorance of the kind of machine under trial.

We are now ready to consider a phase of the question which I want to treat with the greatest care as to the words I use and the impression I leave.

I believe that among the serious factors in this matter of milk test variation are the errors of the testing operation. Let us discuss this possibility of error in the manipulation of the test under the sundry subheads, sampling, apparatus, errors of ignorance and errors of intent.

SAMPLING.

By no art of legerdemain can a milk analyst return a correct result from an incorrect sample. I am inclined to think that a considerable part of the variation between tests is due to imperfect methods of sampling.

Three methods of sampling are more commonly in vogue, the dipper method, the core method and the automatic method. The latter is applicable to milk sampling only, unless very large quantities of cream are brought to the factory. The two former are used for both milk and cream. The first named is the most widely used of the three. From the mass of milk or cream more or less (almost always less) thoroughly stirred (and, indeed, often not stirred at all) a gill or less is dipped for a sample. Such procedure may result in

an accurate sample and it may not. Fresh milk, not creamed, well aerated and stirred, carted over rough roads and drawn from cows not giving large fat globules, may be accurately sampled thus with a minimum amount of stirring. On the contrary, milk which has creamed, which is a day or more old, from Jersey or Guernsey cows, but slightly shaken in transportation, if in considerable quantity, cannot be mixed with sufficient thoroughness to insure accurate sampling by superficial stirring. The Vermont station several years ago did much work in investigating methods of milk sampling, as a result of which we are prepared to say with a fair degree of assurance, that when five hundred pounds of milk somewhat creamed is delivered at the factory, there is no surety of the accuracy of the sample taken therefrom by the dipper method, unless it be stirred for from two to four minutes, round and round and up and down. Hence it is wise to consider the advisability of choosing some method which is more likely than this one to insure accurate sampling.

While there is no method of sampling which is not open to defeat through improper handling, there are methods wherein there is a greater proportion of automatic action than in the one just considered. The coring method is one of these. Several devices designed to core milk or cream are used. The Scovell sampler, which was used in the World's Fair tests in 1893, is a fair type of this class of implement. It consists of a small brass tube with a perforated sliding cap at the bottom. It is lowered into the fluid slowly so that it will flow into the tube until it strikes the bottom, when the perforated cap slides over and closes the tube, thus procuring a core. This method of sampling, provided the cream is not separated in clots and the milk is neither loppered or frozen, will take a correct sample if carefully used. It is more likely to take a correct sample than is the dipper method, or, rather, is less likely to take an incorrect one. This method is much to be preferred to the dipper method for cream sampling.

This is, however, a method applicable to milk but not to cream sampling which suits me better than either of these, known as the automatic method. The apparatus for this consists of a weigh can covered by a cone-shaped wire cloth or wire mesh, and some means of withdrawing a small stream from the outflowing milk. This small stream may be abstracted by means of a small faucet, set at the bottom of the can within a few inches of the outlet gate, or by means of a hole punched in the conductor head or spout. The petcock or faucet modification of this device on the whole approves itself to me rather than the other.

The milk being weighed, both the gate and the petcock are opened and remain opened until all the milk has run out. A small proportion, varying according to the size of the orifice of the petcock, is

caught. The relatively small amount of milk caught in the pail is very readily mixed, and the gill taken. The fine wire-mesh strainer distributing the milk into a thousand streams serves to quite an extent to mix it. I do not advocate the automatic device unless the fine wire mesh be used.

Governor Hoard of Wisconsin states that the first device of that kind used was placed in his creamery, and is yet in vogue. As used by him a hole is punched in the bottom of the conductor running from the weigh can to the vat at a point near the vat. The milk when turned into the weigh can is mixed to quite an extent; the gate is then lifted and it pours out in a rush and it mixes itself running and tumbling over and over, and just as it nears the vat, a drop or so from every pound of milk falls into the jar. The drip obtained as far from the weigh can as possible.

This method is not only theoretically accurate but has proved to be practically correct in thousands of trials; and it has been found to obviate a large part of the errors and annoyances of sampling. The device has been tried over and over again as against extreme care in sampling, and has proved, I think, correct in every case. It may be mismanaged, but it more surely takes an accurate sample than any other practicable method since the sample in part takes itself, regardless of care or lack on the operative's part.

APPARATUS.

A law was passed at the last session of the Vermont legislature which required, among other things, that the Babcock test apparatus used in dividend-making be accurate. I have on this table six bottles. Three are good and three are bad. Can you tell which is which? The manufacturer "guaranteed" that all were accurate; yet notwithstanding this guaranty some were excessively inaccurate. Here is an accurate cream bottle. How do we know it is so? Not because the manufacturer says so, but because, in accordance with law, the Vermont station has found out whether it is accurately graduated or not, and certified thereto, if correct, by grinding indelibly upon the neck of the bottle VtExSt.

One creamery insisted that we send back all the bottles we found to be incorrect. We did so. I doubt whether they were used, however, afterwards; for we ground indelibly upon six places on each bottle the word BAD.

We found that one out of every thirty pieces (three per cent.) of the apparatus in use before the law was enacted was inaccurate, some exceedingly so. All the apparatus that is being sold by the Vermont supply houses to-day is correct, because it is all submitted to our inspectors and only the correct pieces shipped them. As it

comes to us now less than one-half of one per cent., one in two hundred, is incorrect. Clearly this section of the law is of benefit.

The law is imperfect however. It should cover the accuracy of the centrifugal testing machines. There are centrifugal testing machines in use at creameries so constructed that they cannot give correct results; and many are worn out. The law should provide for the inspection of these machines and prohibit the use of such as yield incorrect results.

ERRORS OF IGNORANCE.

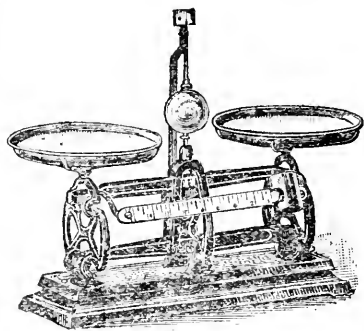
The Vermont law requires that every operator of the Babcock test for dividend-making shall be examined as to his knowledge of the method of its operation; and that he shall secure a certificate from the dairy school of the University of Vermont and State Agricultural College that he is competent and well qualified to perform the work.

The law has forced many operators to perfect themselves so they could pass the examination and get a license, who otherwise would have tested with but a half knowledge of the process. There have been tested up to January 1, 1902, over 27,660 milk and cream bottles and pipettes of 362 would-be licensees. Large numbers of incorrect pipettes and acid measures have been detected and reg graduated and are not included in this showing. Had it not been for the law 457 incorrect bottles would have been used as measures of dividends. Had it not been that this law was on our statute books, over fifty incompetent operators unable to test correctly even under conditions when if ever they would have striven to do their best, would have been to-day adjudicating the value of milk at Vermont creameries and factories. A considerable number of operatives were refused licenses on the first examination, but were granted them after they proved on second trial, that they had learned how to test milk. Every man testing in Vermont to-day at least knew how to test when he took the examination. Whether in actual work he does as well as he knows is another story. I see no reason why a law of this sort should not work well in Pennsylvania. It works no hardship to any one, provides for the removal of incorrect apparatus and keeps incompetent men out of responsible places.

Many operators have protested against our ruling that they test cream on the ground that whole milk only was delivered at their creameries. We have insisted on this point for three reasons. In the first place the law refers to the testing of both products; then again, the farm separator is so commonly used, that most creameries are equipped and all must soon be equipped to test cream; and, finally, there is a greater likelihood of error in cream analysis than in milk analysis. This error is largely due to the fact that when cream is pipetted—particularly separator cream, or, indeed, any

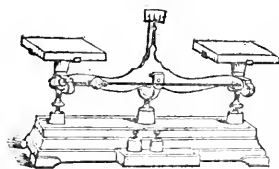
cream carrying over twenty-five per cent. of fat—it is so thick that it does not flow readily. Eighteen grams is not delivered into the bottle by measuring eighteen cubic centimeters. Then, again, the cream may be frothy or filled with gas bubbles. These errors cause low results, unless they are avoided by the use of a correction table (which does not surely “correct”) or unless the pipette delivery is weighed.

The proper amount of cream is most surely obtained by weighing the pipette delivery. So many fail in this matter that I want to make it clear. The apparatus needed is simply a small druggist's scale and a few weights. The empty cream bottle on one scale is balanced by the slide or weights on the other. An eighteen gram weight is added and the well mixed cream is pipetted into the cream bottle until the balance swings evenly. The test is then proceeded with as usual. The operation is no more intricate than is the weighing of the butter into the tub in which it is packed. It is precisely the same thing, weighing into a weighed empty package a given weight of the material wanted. The extra time consumed need not be more than a minute to the sample, and as a result of its expenditure far greater accuracy is insured. Every patron taking separator cream to a creamery should insist that the management test eighteen grams of his cream, that they weigh the delivery of the pipette.



That this matter may be made the more clear two pictures of cream test scales are given. The larger one is manufactured by the Springer Torsion Balance Company, 92 Reade Street, New York. The empty cream bottle is placed in the specially adapted left-hand pan, is counterpoised by the slide and weights or both, and then eighteen grams of cream are pipetted against an added eighteen gram weight

The smaller cut shows a new scale made by Henry Troemner, 710 Market street, Philadelphia, Pa. It is as nearly rust-proof as possible, its three inch bearings are set with agate and its pans are made of porcelain. Its method of use is similar to that indicated for the Springer scale. These scales with weights cost from eight to ten dollars, and both are excellently adapted to the purpose.



ERRORS OF INTENT.

I believe in the “open door” system in a creamery. I would have the management open its books and its testing operations to patrons. I know of one creamery where the test is done in secret and the books

kept under lock and key. Secrecy is unwise; publicity disarms suspicion. Dishonest methods of sampling or testing are used occasionally. I believe that "occasionally" is as strong a word as is warranted by the facts. I feel that ninety or ninety-five per cent. of the troubles which agitate the patrons as to the test system are imaginary rather than real. Yet, unfortunately, sometimes errors of intent, deliberate dishonesty, exist. I have, however, no sympathy for a patron who growls, or swears, or whines, who claims that he has no recourse, that he is in the hands of a management and must take what they give him, who alleges incompetence or worse, without striving to correct it or to confirm his allegations by investigation. He has recourse. He can, if he will, work out his own salvation, either by his own hand, by that of some bright young man or woman, or by that of Uncle Sam. If he is sincere, if he really wants to learn the truth, he can help himself or be helped to attain the right in the manner already cited.

One of my former associates on the Vermont Board of Agriculture was wont to say, that in this era of trusts, which are viewed with some suspicion, there is the one trust we should accept to a greater extent than we do, and that is "trust one another." The present creamery conditions do not, in my judgment, warrant the wholesale feeling of distrust which is prevalent among patrons. I would substitute for the word "distrust" one which I think will be found far more helpful as a means of arriving at the truth, one which will satisfy the creamery management far better, the word "investigate."

Do not *distrust* but *investigate*. I am confident that most creamery managements will gladly meet candid and sincere patrons more than half-way in the investigation of apparent discrepancies and in the rectification of any proved inaccuracy or injustice. When the day of general mutual investigation dawns in creamery work there will be greater harmony between patron and management, and better work all around.

SPECIAL BULLETIN, OCTOBER, 1899.

VERMONT STATE AGRICULTURAL COLLEGE AND EXPERIMENT STATION.

SAMPLING MILK AND CREAM.

Dairymen are learning to use the Babcock test more every year upon their individual cows or the entire dairy, either using it themselves or having tests made for them at the creamery or by the experi-

ment station. The results of analyses are useless and misleading if obtained on poor samples. There is reason to believe that many do not understand how easy it is to take an incorrect sample.

The following directions for accurate sample taking are printed for the information of the dairymen of the state. Copies will be sent without charge to any address on application to the Experiment Station, Burlington, Vt.

1. *To test individual cows.*—Provide as many fruit jars (pints or quarts) as there are cows to be tested. (Wide-mouthed bottles will do if jars cannot be obtained. If used, they should have tight corks. Narrow-mouthed bottles make accurate sampling difficult and often impossible.)

Label each jar. Into each put preservatives to keep the milk sweet. (Use either formalin, sometimes called formaldehyde, about 20 to 30 drops; or corrosive sublimate, colored with analin red, about ten grains; or potassium bichromate, not more than ten grains. Formalin is preferable and non-poisonous, the other two are poisons and should be handled carefully. These, or some one of these, may be obtained at any drug store or at the local creamery.)

At the first milking pour the entire milk of the cow back and forth from one pail to another not less than three times and then at once dip out approximately a gill (a gill cup on a long handle works well—a small tea-cup will do) and pour into the jar. Close the jar and keep it closed until the next milking. Proceed thus with each cow. At the next milking repeat the operation, adding a second gill of recently-poured milk from the first cow to the gill taken at the first milking, and similarly with the other cows. Proceed thus for from four to eight successive milkings, keeping the jar closed except when putting in the milk. This makes what is known as the composite sample, one which is much more trustworthy than a sample taken from a single milking. If samples are to be transported, the last sub-sample of each composite sample taken should be made to fill the jar absolutely full to prevent churning while in transit.

Cows vary considerably in the quality of their milk at different stages of lactation. If only infrequent samples are taken, most nearly accurate results (that is, such as will most closely indicate the average quality for the year) will be usually obtained if samples are taken approximately as follows:

Cows calving in the spring: One composite sample six weeks and another six and a half to seven and a half months after calving; or two composite samples, taken about two weeks apart six months after calving.

Cows calving in the summer: One composite sample eight weeks and another six to seven months after calving; or two composite samples, taken about two weeks apart, from three to five months after calving.

Cows calving in the fall: One composite sample eight to ten weeks and one five and a half to seven months after calving; or two composite samples, taken about two weeks apart, from five to seven months after calving.

Samples taken at other times may give satisfactory results. Prolonged experience has shown, however, that greater likelihood of getting a correct average for the year is attained by sampling at these times.

II. *To test the entire dairy as a whole.*—Prepare a fruit jar as under I. If the churn will hold the entire milking, pour it in and slowly revolve the churn for a couple of minutes, then draw out, taking a gill soon after starting the milk out of the gate. Repeat for several milkings as under I.

If the milking is too big for the churn, pour the milk in each large can three or four times back and forth and after the last pouring of each can dip out at once a gill into a second jar. Having gills from each can united in the jar, pour these not less than three times. Take one gill and put into jar as under I. The stirring method of sampling from large cans should not be resorted to unless neither of those cited above is practicable. If used, the contents of each large can should be vigorously stirred with a long handled dipper round and round, reverse, and dipping deep, from one to three minutes, and a gill taken into a second jar at once on the completion of the stirring of each can of milk, the several united gills to be poured and one gill taken for the final composite sample which should be built up as under I.

III. *To test cream from the dairy.*—(a.) Shallow setting cream. This class of cream cannot be accurately sampled or tested.

(b.) Deep setting or so-called "gravity" cream. The entire lot of cream merged together should be poured as with milk under II, and a gill taken into a jar as under I.

(c.) Separator cream. Proceed as under III. (b.) If thick, stirring may suffice as under II.

Not less than a pint should be used for a sample. Small samples and narrow-mouthed bottles are untrustworthy.

IV. *To test skim milk from the dairy.*—(a.) Shallow setting. If sour, add a little caustic soda or lye and mix and pour until fluid. Put a gill into a jar without preservative. Make composite sample (four sub-samples) as under I.

(b.) Deep setting or so called "gravity." Pour or stir vigorously; take gill from each can and finally pour or stir the united gills and take a single gill. Make composite sample (four sub-samples) as under I, using preservative.

(c.) Separator. Catch skim milk from three to five times each run distributed throughout the run. Pour and take a gill for composite.

Make four sub-sample composite for test as under I, using preservative.

Less time need be spent in mixing skim-milk than with the whole milk or cream.

V. *To test buttermilk or whey.*—Draw directly from gate or siphon; make use of the composite sample with preservative.

VI. *To check correctness of test at creamery or cheese factory.*—

(a.) Halving creamery sample. When the creamery composite sample is complete and ready for testing, require the operator to furnish one-half of it. Be certain that the sample is thoroughly mixed by pouring, that all the cream from the sides of the jar, cover, etc., is mixed back into the milk or cream, and that the halving is done immediately after the last pouring.

(b.) Duplicating creamery sample. Every time that the party sampling milk or cream at the creamery or on the gathering route samples a patron's milk or cream, the latter may require him to furnish a duplicate sample in a jar controlled by the patron. Duplicate composite samples may be made thus which should tested closely alike.

(c.) Sampling at the dairy. Follow directions under II or III.

Either of these three methods of checking creamery testing is open to objection. In (a) the sample or testing may be incorrectly managed at the creamery, the sample being under control of one of the interested parties, the creamery man. In (b) the sample may be improperly handled by the other interested party, the patron under whose control it is located. Method (c) resembles (b) in this respect, and, moreover, results may be vitiated because of error or insufficient care in sampling.

The experiment station strongly urges dairymen as far as possible to make use of the Babcock test at their own homes. It is of more value as used between cow and cow than for settling money matters between man and man.

To such residents of the State as do not consider it advisable to make their own tests, or to have neighbors make them for them, the experiment station offers its services to a limited extent. It cannot do regular and wholesale testing for any individual or company, but will handle small numbers of samples without charge. It makes but few requirements, as follows:

1. Samples should be carefully taken in accordance with these instructions.

2. Wide mouthed jars should be used.

3. Jars should be filled absolutely full to prevent churning in transit.

4. Express charges should be prepaid. In case jars are desired back again, the express agent should be asked to affix a "free return empty" label on the package and it will be returned without cost.

5. The shipper's name should be placed upon the package for purposes of identification.

DISCUSSION.

Q. What is the cause of the milk test being high in the fall and low in the spring?

A. The usual cause for milk tests running higher in the fall than in the spring is the fact that the cows are farther along in lactation, farther advanced in pregnancy, and that the material which had hitherto been going to the manufacture of milk goes in part to the building up of the body of the unborn calf. This cuts down the amount of milk, but not the amount of food material it contains proportional to the milk shrinkage; hence the quality of the milk is bettered.

Q. What would be the temperature of the acid and of the milk when testing?

A. It is wise to have the temperature of the acid and of the milk about the same. It does not make any great difference whether this temperature be 50 or 70 degrees, so long as they both are about the same. Better results are obtained when the temperature ranges between 50 to 70 degrees than if they be lower. I do not, myself, lay as great stress as do some on this matter of the temperature of the acid and milk, providing, as I have above remarked, they are nearly alike.

Q. If samples of milk are taken every morning, what is the best method of preserving the milk until it is tested?

A. The milk is best preserved by the use of either one of two chemicals—corrosive sublimate or formalin. Each of these materials has its advantages and disadvantages. The former is a violent poison, but otherwise an ideal material. The latter is non-poisonous, or practically so, but hardens the curd, making it a little more bother to dissolve it, when the acid and milk are mixed together. The tests where formalin is used always afford very clear readings, its preservative powers are great, it is very cheap, and I believe all things considered is to be preferred over corrosive sublimate.

Q. Would there be any difference in the milk of a herd well stabled in the winter, and that of one not well sheltered?

A. The herd which is well stabled would be likely to make more of a somewhat poorer milk than would the one not well sheltered, all other things being equal. This does not mean that one may improve the richness of the milk of his herd by ill treatment, but simply that exposure of any kind tends to lessen the milk flow, lessening the liquid portion more proportionately than the solid matter. As I remarked in the course of my address, no one can afford, in my judgment, to endeavor to warm all outdoors with the food fed to a herd

of dairy cows. It is at the expense of potential products and profits.

Q. What should the over-run be to show that the test has been correctly taken?

A. It is possible to make one-sixth more butter than there is fat in the milk. This possibility, however, is not always attained. One-seventh is entirely practicable. One-eighth excess is rather less than the average obtained at the creameries. If a creamery regularly returns more than one-sixth, which is equal to 17 per cent. surplus, the chances are that the tests are incorrectly made, or samples incorrectly taken, or that a very wet butter is made. If, however, the surplus is less than 12 per cent., which is equal to one-eighth, one may look for loss in the manufacturing process through faulty work or poor apparatus, or for incorrect test samples.

Q. I would like to know whether Professor Hills considers the method formerly in use for obtaining the total solids a correct one. I refer to the lactometer.

A. The lactometer is used to determine the specific gravity of the milk. If, however, in addition a Babcock tester be used to obtain the fat percentage, one may calculate the total solids using this formula: $T = 1.2F + (L \div 4) + 0.14$. This formula is used as follows: To one and two-tenth times the fat add one-fourth of the lactometer reading and also 0.14. The result will give a close approximation to the total solids providing the lactometer reading was taken at 60 degrees F. If it was not, the lactometer reading should be corrected 0.1 point for each degree of divergence, adding for a higher temperature and deducting for a lower temperature.

Q. What is the correct specific gravity of the sulphuric acid used in the Babcock test?

A. 1.82 to 1.83. If the acid is not as strong as this, use more. If it is stronger, use less.

Q. I would like to ask an explanation of the statement regarding nervous excitation causing deterioration of the milk. Is not the milk already formed in the udder before the milking begins?

A. It is in part, but just how much is a mooted point. There are few places in this world as dark as the inside of a cow, and what we do not know about the formation of milk would fill a book. Indeed, those investigators who have studied this question most deeply are willing to admit that they know little or nothing as to how milk is made. Theories abound, but proved facts do not exist. It is, however, a general belief that the solid portions of the milk and particularly the fat globules are to a large extent formed in what might be termed their milk shape after the milking process had commenced. At any rate there is much evidence that seems to corroborate this notion. Certain it is that a deep milking Holstein, making, as some have done, over fifty pounds of milk at a milking, does not appear to

have the capacity, even in its full udder for that amount of milk made. In other words the milk they make in the process of the milking operation would appear to be more than the udder could possibly hold at any one time.

PLAIN FACTS ABOUT COMMERCIAL FEEDING STUFFS.

By DR. W. H. JORDAN, *Director of the N. Y. Experiment Station.*

The trade in commercial feeding stuffs is largely of recent development. It is a trade complex in its features and requires for the proper understanding of it a great variety of information. In earlier times only the cereal grains in their entire condition were found in commerce; now by-products from a number of manufacturing operations, which consist of parts of various seeds, including oil seeds and farm grains, are found in the markets. For instance, we have refuses from the manufacture of oil, the manufacture of starch and glucose, the manufacture of spiritous liquors, the manufacture of breakfast foods, and so on. Such refuses generally differ from the seeds from which they were derived in showing a concentration of certain parts or compounds of the seed because of a withdrawal of certain other parts or compounds. Many of these offals have an undoubted value for feeders of all classes of farm animals. Indeed, some of the by-product commercial feeding stuffs have equal or greater value than the original seeds from which they were produced. At the same time these by-products have a greatly unequal value, some of them being almost worthless and others possessing the highest quality. Until one of these feeds is investigated as to its composition and utility for various kinds of feeding, it is an uncertain quantity. It requires, therefore, on the part of the consumer a constant watchfulness and search for information concerning the newer products which are offered in the markets. One fact which renders watchfulness and an intelligent understanding of the feeding stuff market so essential, is the numerous mixtures of the various by-product materials which manufacturers are constantly compounding as a means either of disposing of their manufactured by-products or of making a low cost feed which can be sold at a larger profit than the standard articles.

These numerous feeding stuffs will be found to differ in two ways, (1) in composition and (2) in digestibility. To illustrate, linseed meal contains a large proportion of protein and a minor proportion of the non-nitrogenous compounds, while hominy feed contains practically no more protein than corn meal and a very large percentage of the

carbohydrates. Between these extremes there are all gradations in the relative proportions of the several ingredients. It is not difficult to learn what these differences are and how they range when we are dealing with standard articles. When dealing with mixtures which pass under the general name of mixed feeds or under proprietary names, we have nothing to guide us other than the assertions of manufacturers, sometimes of doubtful accuracy, or the safeguards provided by law.

Important differences are also found in the digestibility of these materials and this is a matter of great moment, because the only substance in a feeding stuff which is useful to the animal is that which is dissolved by the digestive juices and absorbed by the blood.

Feeding stuff adulteration is widely practiced at the present time. By adulteration I mean the introduction into a material of a certain grade of something inferior either in nutritive value or in cost. There are those who deplore any references to dishonest practices in trade, such as adulteration, because they say it will hurt business. I would very much regret injuring the business of any honest manufacturer of any thing I might say here to-day. I wish to bear testimony to the uprightness and straightforward business methods of a large proportion of the feeding stuff manufacturers and dealers with whom I come in contact either directly or by correspondence. Many of them, yes, the most of them, have as great a desire to maintain their goods up to the standard which they set for them as any class of business men have to deal fairly. If adulterations are practiced it is necessary to make plain what they are and if trade is thereby injured, the responsibility does not lie with the men who search out such dishonest methods or with the consuming public that is made the victim of dishonesty, but it lies with the disreputable manufacturers themselves. There are very good reasons for believing that local country millers frequently practice greater impositions on nearby farmers than do any of the large and well-known manufacturers of feeding stuffs whose headquarters are in the city. Rural trade ethics and urban trade ethics may often be compared to the great disadvantage of the former. I, for one, shall not hesitate to speak plainly concerning those devices of commercial greed by means of which one man defrauds another. The ethics of trade in this country need reforming in certain quarters. There is altogether too lenient a spirit toward the man who declares that he must practice this or that deception in order to maintain himself against the competition of the market or who excuses his unwholesome methods by declaring that others are guilty of the same. We should not cry peace when there is no peace. To-day, therefore, I shall first describe briefly the principal feeding stuffs which are now found in our markets, indicate the standards by which we should measure these

materials, point out some of the ways in which they are adulterated and refer to certain precautions and preventions which must be utilized by the farmer in order to protect himself in so complex a trade.

CLASSES OF FEEDING STUFFS.

1. Natural Grains.—When the cereal grains and other seeds are sold in their unground, natural condition, they are easily recognized by all who have any familiarity whatever with agricultural matters and they need no comment or description from me. When sold in the ground condition they are at present adulterated to some extent, a matter to which I shall refer later.

2. Oil Meals.—Several seeds, such as cottonseed, flaxseed, rapeseed, etc., contain very large percentages of oil which, either by pressure or by the use of a solvent, it is possible to remove. These oils have their important uses in the arts. It is the residues from their extraction in which we are interested as farmers. Cottonseed meal, as well as all other meals from the oil seeds, contains practically all the compounds of the seed, except the oil. In other words, the protein compounds, carbohydrates, together with a small proportion of the oil, are left behind when the crushed seed is submitted to pressure or leached with a light benzol. There is then a concentration of certain parts of the seed in the waste and for this reason we see the protein in pure cottonseed meal always ranging above 42 per cent, and sometimes reaching nearly 50 per cent. The same facts are in general true of linseed meal in which the proportion of protein reaches 35 or 36 per cent. There is no reason to suppose that the compounds which are left in the by-products from the oil seeds are injured for nutrition purposes by the pressure, heat or other influences to which they are subjected.

3. Starch and Glucose Wastes. The seed of Indian corn, or more properly maize seed, contains a very large proportion of starch. Inventive ingenuity has discovered mechanical methods for separating this starch from other parts of the kernel, which may be sold as such or subjected to the action of acids and converted into glucose. As in the case with the oil meals, the starch wastes are not injured by the processes of manufacture, as the maize kernel is only subjected to crushing and to the action of water. There is a variety of these wastes from starch manufactures and concerning them there has been much confusion of understanding by people at large. Farmers are quite accustomed to simply designate these materials as gluten.

Starch waste include three kinds or grades of material. The most valuable part is what is properly known as gluten meal and it consists of the flinty portion of the maize kernel which lies directly

under the hull and outside of the central portion of the seed which is more purely starch. Gluten meal contains practically as much protein as linseed meal or from 35 to 37 per cent.

Another starch waste is the hull of the maize kernel itself, which is undoubtedly of less value than the same weight of the entire kernel. This hull is sometimes spoken of as sugar corn waste and corn feed, but is more properly designated as corn bran.

Gluten feed, the third form of waste from starch manufacture, is simply a mixture of the gluten meal and the corn bran. This material contains approximately 25 per cent. of protein. It is important, therefore, for the dairyman to clearly understand whether he is buying gluten meal, gluten feed or corn bran. There is a great difference in the proportions of the constituents of these several materials and also differences in their digestibility.

4. Brewers' and Distillery Wastes. Sugar is required for the manufacture of alcohol, whether it is found in old-fashioned New England rum or in lager beer. At the present time this sugar is obtained from our cereal grains, chiefly corn and barley. The first thing which is necessary is the conversion of the starch of these grains into maltose, a form of sugar. For instance, the maltster submits moistened barley grains to a certain temperature for a certain length of time, until these grains have sprouted and the ferment action in their interior has converted a large part of their starch into sugar. The sprouts which appear on these grains are rubbed off and are known in our markets as malt sprouts. They are a useful feeding stuff, carrying about 25 per cent. of protein. The grains minus the sprouts are crushed and the sugar is extracted, this extract afterwards being submitted to a fermentation for the production of alcohol. The extracted grains, after drying, are sold under the name brewers' grains and contain about the same proportion of protein as malt sprouts. There are also found for sale distillery wastes, which are produced by the manufacturers of whiskey and other liquids of a like character. Here we have the characteristic high proportion of protein.

5. Wheat Offals. No feeding stuffs are more widely or more favorably known than wheat bran and wheat middlings. These have come to be regarded as standard materials. Formerly they were sold in separate form, but now it is the custom in many mills to run the offals from the milling of wheat together into one mixture, to be sold under the general term mixed feed. If the screenings and other inferior mill wastes are not run into this mixed feed the latter practice is not disadvantageous to the farmer perhaps. Many mixed feeds of this class, however, appear to contain a good deal of inferior material.

6. Breakfast Food Wastes. Within the past twenty-five years there has been a remarkable increase in the variety and quantity of

prepared breakfast foods, such as oatmeal, rolled oats and others bearing proprietary names. From the manufacture of all these there are derived by-products which find their way into the market mostly as cattle foods. The by-products most important in this connection are those coming from oats. In the first place, the manufacturer uses only the largest and heaviest grains and rejects the smaller and lighter ones. The latter are sold to the farmers. From the heavy, larger grains the hull is removed, the kernel itself being all that is used in preparing foods for human consumption. These oat hulls should either be burned or sold for some inferior purpose, but, so far as I can judge, they are finding their way into the market to be used either honestly or dishonestly in the manufacture of mixed feeding stuffs. This will be referred to in discussing adulterations.

Two by-products from the manufacture of buckwheat flour are buckwheat hulls and buckwheat middlings. The latter of these is a valuable feeding stuff, the proportion of protein being practically the same as that in gluten feed or the brewer's residues. The hulls are comparatively worthless for feeding purposes. Often the middlings and hulls are sold in the mixed condition, and in such cases the value of the mixture depends upon the proportion of the hulls.

7. Beet Sugar Wastes. Two new by-product feeding stuffs have appeared among us since the introduction of the manufacture of beet sugar in this country, viz: Sugar beet pulp and sugar beet molasses. The former in a fresh condition carries approximately 90 per cent. of water, and can scarcely be a profitable feed at any great distance from the factories owing to the great cost of transporting so much useless material. This pulp is inferior to the same weight of beets before extracting the sugar and does not differ essentially in its general character from roots and other succulent carbohydrate feeding stuffs. It appears that this sugar beet pulp is now offered in a dried condition and if the price is sufficiently low it may doubtless be purchased to advantage by those farmers who have an insufficient supply of coarse foods. The only ingredient of value in beet sugar molasses is the sugar which has not crystallized. This molasses contains from 50 to 60 per cent. of sugar and may be combined advantageously with coarse fodders and nitrogenous feeding stuffs in making up a ration for various classes of animals.

8. Hominy Wastes.—In the manufacture of hominy quite a portion of the maize kernel is rejected and is known in the market as hominy feed. The composition of this by-product is not essentially unlike that of the whole maize kernel, and it is very nearly equal to corn meal in feeding value. At the present time the price of this feeding stuff as compared with corn meal is such that it may be purchased with advantage.

The above is a brief reference to the principal feeding stuffs found in the markets. A determination of the ones which a farmer can

most advantageously purchase depends upon the ruling prices. There are no hard and fast relative values which can be applied to a determination of the materials which it is wisest to purchase. It is possible to base a rational decision upon a comparison of the proportions of digestible material in feeding stuffs of the same class. This does not apply, however, when comparing feeding stuffs of unlike classes. To illustrate, it would not be possible to compare the value of corn meal and cottonseed meal on the basis of the proportions of digestible matter in the two materials, because the digestible matter in the one so greatly unlike that in the other.

MIXTURES AND ADULTERATIONS.

No more important topic in connection with this general subject can be brought to your attention than the present quite prevalent practice of compounding mixed feeds which contain an inferior ingredient and of adulterating many of the valuable feeding stuffs which now appear in the markets. Let us consider some of the facts which are well known to those who are investigating the feeding stuff trade.

Let me say, first of all, that I have known of very few instances of the adulteration of linseed meal. Up to the present time no feeding stuff has been more uniform in its quality than has this one. Inferior cottonseed meals appear in the market quite frequently however, Here the degradation of quality is accomplished by grinding hulls with the pure meal. Some so-called cottonseed meals have been found on sale carrying less than 30 per cent. of protein, whereas the proportion should be above 42 per cent. at least. When such mixtures are sold for what they are, as for instance in the case of cottonseed feed, no fraud is perpetrated, and the consumer is left to make a free choice.

So far as I have observed, the only danger of unfair dealing in the sale of the wastes from the manufacture of starch from the maize kernel lies in a failure to understand clearly the differences in these articles and consequently of buying corn bran instead of the more valuable gluten feed or gluten meal. I suspect that in some instances finely ground corn bran has been sold under the name light gluten, or special gluten, and it would be very easy to mix such finely ground corn bran with gluten meal or gluten feed to the advantage of the dealer, because of the lower price of the bran.

One of the most notorious adulterations now practiced is the mixing of ground corn cobs or ground broom corn waste with wheat bran. A sample of this character came into my hands the other day. One of the feeds licensed in the State of New York is such a mixture and is guaranteed to contain only 11.8 per cent. of protein, whereas pure bran contains from 15 to 16 per cent. This adulteration may

easily be detected by any one who will give careful study to the general appearance of pure bran and who has had an opportunity to inspect the mixture. A deterioration of wheat offals is also brought about by introducing into them various inferior mill wastes. The presence of this inferior material is generally made evident by the hulls and parts of weed seeds that may easily be seen.

Taken as a class, various mixed feeds known under a great number of names are probably the worst impositions now being practiced upon the farmers of this country. In these the inferior ingredient is generally oat hulls. Oat hulls are probably worth less than good cut oat straw. In fact, I consider them inferior to any straw whatever. Two years ago we took a large number of samples of so-called corn and oat feeds sold in the State of New York, and we found very few that were not compounded by the use of a certain proportion of oat hulls. The immediate responsibility here lies to quite an extent with the local millers that are found scattered all over this and other States. They can purchase these oat hulls, sometimes unground and sometimes ground into a very fine condition, so that they are not so easily detected, at a very low price, and by introducing 25 per cent. by weight of these hulls into corn meal or hominy feed, can produce a feed which closely resembles genuine corn and oat chop and which is sold at the price of genuine goods. It is not difficult for one who will give the matter a little attention to detect the difference between these inferior mixtures and genuine corn and oats. The oat hulls present have a different appearance and none of the crushed oat kernels can be seen in the oat hull mixture. There are sold very generally throughout the country certain proprietary feeds which in many cases are a mixture of several materials. In many instances these feeds are mixed by the manufacturers for the sole purpose of disposing of their waste products, one of which, oat hulls, would not find a sale in the markets if not disguised by the presence of more valuable ingredients.

Even the ground cereal grains, such as corn meal, are adulterated. Two materials are at present used for adulterating corn meal, one of which is hominy feed and the other is corn bran. It may be claimed that the mixture of hominy feed with corn meal does not constitute an adulteration, because the former is nearly equal in feeding value to the latter. It is an adulteration, however, when the hominy feed can be purchased at a considerably less price than the corn meal, because by selling the former at the price of the latter an imposition is practiced upon the consumer. He buys at a higher price a material of lower commercial value.

I have in my possession a circular letter addressed by a prominent jobber in the State of New York to millers explaining to them how by the introduction of ground corn bran into corn meal they can

make corn meal at a price which will enable them to compete successfully in the market against other millers or dealers.

This is also an adulteration which is an imposition upon the consumers. Corn bran is sold for much less than corn meal at the present time, and has undoubtedly a lower feeding value. It is easy to see that the kind of adulteration practiced will be determined by the relative prices of feeding stuffs. When two materials similar in appearance have quite different selling prices there is always a temptation for dishonest dealers or millers to mix the one with the other.

PRECAUTIONS AND PREVENTIONS.

At the present time the people of this country are much inclined to resort to legislation as a means of curing various evils. Such legislation is wise. As applied to feeding stuff control it is of undoubted value. First of all, feeding stuff inspection laws have an educational value. When the terms of such a law become known, buyers are inclined to give a great deal more attention to the composition of feeding stuffs than before. This is true, because laws of this nature now on our statute books in several States require that manufacturers or dealers shall file with some State department the guaranteed composition of the goods. Through these means and the publications which are occasionally issued as a result of the inspection, consumers become more familiar with the composition of the various feeding stuffs than would otherwise be the case.

Moreover, through the guarantees and the proper marking of the various brands of feeding stuffs the purchaser is protected against buying inferior materials. To illustrate, cottonseed meal should carry not less than 42 per cent. of protein. Linseed meal should carry at least 35 per cent., gluten meal about the same, gluten feed from 23 per cent. upwards, malt sprouts and brewer's grains about 25 per cent., wheat bran and wheat middlings over 15 per cent., pure mixed corn and oats over 10 per cent., and so on. Unless the protein is kept to approximately these figures the material is not pure. Hulls cannot be introduced into cottonseed meal without lowering the percentage of protein and the same thing is true of the admixture of ground corn cobs with wheat bran or any other material. Oat hull mixtures, especially those where their components are corn meal or hominy feed and oat hulls, necessarily carry less than 10 per cent. of protein. When, therefore, the guarantee of a proprietary feed, whatever may be its name, ranges from 6 to 8 per cent. of protein, the purchaser may be pretty sure that he has under observation an oat hull mixture and the purchaser should always remember that an oat hull mixture is only worth what it contains outside of the oat hulls. The oat hulls are not worth purchasing.

It is probable, too, that the penal force of a feeding stuff law counts for something. Some men are honest because they like to be, some are honest because they are afraid to be otherwise, and some have courage enough to be dishonest until they are caught. With the second class and perhaps with the third such a law has some influence.

It must be remembered that after all no law can take the place of intelligence on the part of those whom it is supposed to protect. If the farmers of this country would inform themselves thoroughly in regard to various commercial feeding stuffs on the market, and learn to distinguish the various kinds by mere physical inspection, there would be much less need for legislation than is at present the case. The buyer who is awake to the situation will not purchase oat hull mixtures with the understanding that he is getting pure corn and oats, neither will he long be deceived by bran and corn cobs.

One fact which promotes the sale of inferior feeding stuffs is the foolish desire of so many to purchase something cheap. If one dealer has a mixture which he is offering at a dollar less per ton than some other dealer, the former gets the trade of a certain class of people who consider only price and have no intelligent understanding of quality. It should be understood that even when a feeding stuff inspection law exists it will be largely inoperative unless it has the co-operation of the constituency which it is supposed to benefit. No farmer should allow himself to purchase a feeding stuff which is not sold under the proper guarantee and marks. He should refuse to listen to the smooth statements of some dealer or agent who fails to comply with the requirements of the law and who assures him that he has some remarkably valuable mixture to offer him. The days of magic are past. There are no nutriments of greater value than those which are found in the grains which are raised upon your farms and when any manufacturer claims to have discovered some remarkable material or process, by means of which he can furnish you a cattle food of previously unheard of merit, you should turn a deaf ear.

You have a law in Pennsylvania designed to control the sale and inspection of feeding stuffs. It may be of great benefit to you. Whether it is or not will depend to some extent upon your Secretary of Agriculture, but to a greater extent upon yourselves.

In order to co-operate intelligently with Secretary Hamilton and serve your own interests you should observe the following points which are in part a recapitulation of the suggestions previously made.

(1). Inform yourselves thoroughly as to the composition and appearance of the various commercial feeding stuffs.

(2). Refuse to purchase goods not sold in a legal manner. That is, you are entitled to a statement of the name of the brand, the manufacturers of the same, and the guaranteed composition.

(3). Report to your Secretary violations of the law of which you are cognizant.

(4). In buying, study the figures giving the guaranteed composition. The proportion of protein may tell you much. The different feeding stuffs should contain protein as follows:

Cottonseed meal,	42 per cent. or over.
Linseed meal,	32 per cent. or over.
Gluten meal,	35 per cent. or over.
Gluten feed,	25 per cent. or over.
Malt sprouts,	25 per cent. or over.
Brewers' grains,	23 per cent. or over.
Corn bran,	12 per cent. or over.
Hominy feed,	10.5 per cent. or over.
Corn meal,	9.5 per cent. or over.
Oats,	11 per cent. or over.
Corn and oats chop (pure),....	10.5 per cent. or over.
Wheat bran,	15 per cent. or over.
Wheat middlings,	15 per cent. or over.

Mixed feeds may show a great variation in composition according as they are compounded, but when one pretends to be pure corn and oat chop and has a low protein content, less than 10 per cent. for instance, look out for it.

(5). Regard must be had for the material accompanying the protein. Two feeds carrying the same proportion of protein may have greatly different values, as for instance, a mixture of oat hulls, hominy and a little cottonseed meal as compared with pure hominy feed. The latter is worth much the more because much more digestible.

(6). Refuse to believe in mixtures for which unusual properties are claimed. There are no more efficient nutrients than those grown in your farm crops. Beware of "gold bricks."

(7). Inquire of your Experiment Station in regard to the new commercial feeds.

(8). Compare feeds of the same class on the basis of the digestible matter they contain. This necessitates some study on your part.

Do not compare protein feeds with carbohydrate feeds on this basis. We do not know the relative money value of digestible protein and digestible starch. It simply remains for the farmer to get protein and starch from the cheapest possible sources.

DISCUSSION.

Q. I would like to ask if Mr. Jordan finds adulteration in hominy meal.

A. Yes; there is a ground material advertised, an analysis of which indicates that it comes from corn cobs.

Q. How can this be told?

A. By microscopic examination by an expert.

Q. Is there not an adulteration with plaster sometimes found?

A. In an examination of wheat middlings I have found an adulteration with plaster.

Q. Doesn't the hominy meal have less water?

A. I have not noticed much difference.

Mr. Ferree: The difference in water content of hominy chop and corn meal is due to the fact that the former is kiln-dried, while the latter is air dried. As the consumer almost invariably gets his hominy before hygroscopic equilibrium is established, the lower water content is fully accounted for. It is well worth while to note the water values in studying the compositions of feeding stuffs, and those articles of similar character carrying the lowest averages in water should be preferred.

Q. Is it right to say that the carbohydrates are worth nothing if they cannot be sold?

A. I am not a friend to the scheme of valuing cattle foods on the basis of protein alone, because in New York we can sell any carbohydrate at a big price, and we think that when we buy them we ought to give them some credit. So basing the value upon the protein alone simply ignores the carbohydrates and assumes them to be of no value, which is wrong.

Q. We have carbohydrates to burn, as evidenced by the cattle being turned out to get the fresh air.

A. A woman who married three husbands and cremated them all had husbands to burn, but that don't signify that they were pretty good husbands and worth something. If it is true that the carbohydrates on the farm cannot be sold and because of their superabundance are worth nothing, then purchase should be with reference to protein.

Q. Should not the consideration also be kept in mind that there is a fertilizing value that the carbohydrates do not possess?

A. Yes, that is true. I feel that by a study of the conditions a man must decide whether he ought to buy carbohydrates or protein foods. If he believes that he ought to buy protein foods he can buy them of the best digestible matter; but, I do not see how he can make a comparison between protein and carbohydrates and have it mean very much.

Mr. McSparran: We Pennsylvania dairymen are in the corn belt and put an abundance of corn in our silos. We raise a abundance of corn which we husk and cure in the old way so that our cows have all the ensilage and cut corn fodder needed, and I am not speaking beyond the bounds of reason when I say that practically we have carbohydrates to burn. Our only consideration is to balance that up by the most economical protein.

A. I do not see how you can get any standard except as between foods of the same class.

Q. At the present time, with the very high value of feeds, I should like to ask Professor Jordan whether it is wise to limit ourselves to the narrow ration, or whether it is more economical to feed a wider ration?

A. Professor Hills sometime ago in writing on this differentiated between what we call the physiological standard for the animal and the practical standard for the feeder. The physiological standard means that combination of foods which is most efficient with the animal. The practical standard is that ration which will do the most work with the least expenditure of money. My judgment is that it is better to depend upon the farm resources to the largest extent even to feeding wide rations.

IMPORTANCE OF HYGIENE IN THE DAIRY.

BY DR. M. E. CONARD, *of the Veterinary College, University of Pennsylvania.*

We have heard how to feed cattle and have yet to hear of the character of the food. It is well that we should study for a time the best methods of handling our dairy products.

I feel a little out of place because this is not an audience that needs to be advised in dairy hygiene. Hygiene means the proper use of everything pertaining to life, and dairy hygiene means not only the care of the food of the cattle, but the care of their products. Dairy hygiene has passed the experimental stage. Nature, in her wisdom, has adopted a way of feeding which is not practicable, but it is our duty to come as close to it as we can. She has provided that the dairy product should be taken into the stomach without ever seeing daylight or coming in contact with the open air, or contaminated by outside influences. Its exposure from the time of leaving the gland until it reaches the stomach we call its commercial environment, and during this time the greatest amount of care is necessary. We find evidence of the lack of its care in the feeding of young animals and of bottle babies. We must protect it from dirt—and when I say dirt, I mean dirt in its true sense, matter out of place. Foreign substances which we might not consider dirt may get into it, yet they will cause trouble. We have always practiced care in this matter to the best of our knowledge, but our limited knowledge of dirt has crippled our operations.

We did not know before the advent of the microscope and the laboratory just what dirt was. They have revealed to us the most injurious class of dirt that we can have to contend with—the dust particles which are carried through the stables. Dust is the vehicle on which germs may be carried and is the principle medium that infects our dairy products. Heretofore we have been taught to regard dirt that which was visible to the naked eye, and that any thing invisible was of little or no importance. The microscope has turned these conditions around.

Dust carrying bacteria in stables can be largely prevented. Just to the extent that this contamination is prevented in the first few hours is the danger lessened. While the milk is warm it is more susceptible and furnishes a better medium for the cultivation of germ life. Our stables, therefore, should be so arranged that the animals and the milk are not exposed to dust. If the introduction of germs into milk could be prevented it would keep almost indefinitely. In many of the up-to-date dairies milk is kept sweet for two weeks without Pasteurization, at a temperature of 50. If by the proper care of milk we can prolong its life one day we will avert almost entirely the loss of souring during its route to the consumer. The financial advantage is an important one. I could cite many cases as object lessons. In 75 dairies with which I have been somewhat acquainted, there had been for years a loss of five to ten per cent. of shipment by careless handling. After the adoption of inexpensive, but effectual hygienic measures there has been no loss whatever. There has been no change in the stables, except a general tidiness. Ceilings have been made tight and whitewashed, and the stables provided with drainage back of the cows. The method of feeding adopted has been one to render the stable free of dust. The cows have been kept clean with the curry comb. These simple measures resulted in a saving of ten to twenty dollars a month, while the expense was possibly not one hundred dollars per year.

By adopting sanitary measures we would put ourselves in better position to compete with dairymen north of us. In the northern part of the State, and in the southern part of New York the milk is cooled quickly and gotten to market in better condition than we do here with our limited amount of ice. There where they can cool it so promptly it is not so necessary to have it absolutely clean as here where our ice supply is limited. We must either have cleanliness or cold, though it is preferable to have both.

The effect of the adoption of dairy hygiene on the laborers about the barn is good. In almost every instance there are at first objections by the men. They do not care to milk in the narrow top buckets. They do not like to wear gowns, or to wash their hands. They invariably come to like this care, however, and are given a

wholesome respect for the food which they are handling. A little bit of hygienic sanitation makes the laboring people look upon the dairy as a different class of work.

It is as important to have a good milk room as to have a good stable. This room should be exposed to the open air and be as germ free as possible. It should be small and separated from all other buildings where the animals are kept, and there should be no direct current of air between the two buildings.

Adjourned.

SECOND DAY.—Afternoon Session.

The Nominating Committee made the following report:

President, William F. McSparran, Furniss, Lancaster Co., Pa.
First Vice President, Austin Leonard, Troy, Lancaster Co., Pa.
Second Vice President, M. E. Perham, Niagara, Wayne Co., Pa.
Treasurer, S. F. Barber, Harrisburg, Pa.
Secretary, H. Hayward, State College, Centre Co., Pa.
Directors: Henry W. Comfort, Falsington, Pa.
J. P. Sharpless, Londengrove, Chester Co., Pa.
C. L. Peck, Coudersport, Tioga, Co., Pa.
S. J. McCoy, Elk City, Clarion Co., Pa.
E. P. Forney, Hanover, York Co., Pa.
C. J. Pollett, Kayton, Erie Co., Pa.

It was moved and seconded that the report be received, and that Major Wells, the Chairman, be directed to cast the ballot. Major Wells stated that the ballot was cast.

PLACE OF MEETING.

Mr. H. W. Comfort: One of the letters read before the meeting relative to the time and place of the next meeting recommended that the by-law be suspended which provided for the meeting being held during the first week of December, and that the time and place be left to the next committee. I would like to know what disposition shall be made of this.

Mr. Maloney: If any discussion is in order, I would like to move that the next meeting be held at some place as nearly central as possible, and that the railroad facilities be taken into consideration. I would especially urge that not only should attention be given to securing comfortable quarters, but that the exhibition of fixtures and of butter can be held in the same building. There is loss of time and

division of interest by having the sessions and the exhibit in different buildings. As one interested in the fixture department, I would like to see a better arrangement.

Mr. John I. Carter: I think Harrisburg would be a suitable meeting place, and if it is in order, I move that we meet at Harrisburg. If it is not in order, I move that the place of meeting be left to the Executive Committee.

The President: At the last meeting there was some trouble encountered by the people coming to the exhibit by disturbing the meeting, and I think the idea of our Secretary was to prevent such a recurrence by having the exhibit in a separate building. It was thought better to have the scores read and the exhibit not made public.

Mr. Maloney: It seems to me that part of the function of an affair of this kind is to educate creamery men along the points on which butter is scored. For that reason I think the butter should be put in a place easily accessible, and the points on which the butter is scored made public.

Mr. McSparran: I move that we receive with our endorsement this part of the report of that committee.

Mr. H. W. Comfort: In regard to the communication addressed to the Association by Dr. Armsby, suggesting that the Pennsylvania Dairy Union join with the College in granting diplomas to the graduates of the dairy school, or in some such way endorse those graduates, I would say that the managers approve of the plan very heartily, and I would suggest that the matter be left with the new board to carry out as to detail. If you wish, however, to leave the matter for further consideration, when the letter can be re-read so that all the members can know the full purport of it, I have no objection.

President Sharpless: I think all know the purport of this letter and it has been suggested by one of the executive committee that it be left in the hands of the new board.

Motion to leave the matter with the new board was carried.

Mr. John I. Carter as a member of the Auditing Committee reported a balance of \$40.71 in the treasury. The report was accepted.

President Sharpless: At our meeting a year ago Professor Hamilton, Secretary of Agriculture, was with us, and explained some things about the "oleo" law. He promised that if there was an amendment to the law he could exterminate oleo in a short space of time in Pennsylvania. He is here to-day to explain how that is done.

THE OLEO LAWS OF PENNSYLVANIA.

BY PROF. JOHN HAMILTON, *Secretary of the State Department of Agriculture.*

The topic that is placed upon the programme for me to discuss is called, "The Oleo Laws of Pennsylvania." I do not know whether it was intentional on the part of the committee, to have law in the plural or not. It is, however, a correct statement. In Pennsylvania we have two oleomargarine laws that are operative. One is the old law of 1899; the other the new one of 1901.

As most of the members of the Dairy Union are perfectly familiar with the old law, it seems unnecessary to state anything with regard to its conditions. You know that there was dissatisfaction with the character of it. When the new law was framed, there was a saving clause attached, providing that suits that had already been brought under the old law, should be continued. We, therefore, had several hundred suits under the old law on our hands when the new law went into effect, and they are still in our hands for disposition. But one of two things can be done with these: either to drop from the list, or prosecute them as far as it is possible to do so. The new law differs from the old, in several important respects. When we were discussing the provisions of the old law, it was alleged, that if certain amendments were placed in the new law, there would be a chance for their enforcement, provided the courts sustained the law. The Dairy and Food Commissioner of the Department of Agriculture, can do nothing more than appoint agents, send them out through the State to collect samples, submit these samples to the chemist, and if they are found to be adulterated, have the matter brought to the attention of a magistrate, and the person arrested and fined. If it is a civil action, the defendant has the right of appeal to the court, and the case is then similar to any individual case, prosecuted by an individual citizen. The State of Pennsylvania, stands exactly in the shoes of the individual citizen. Under this new law there is express declaration, that the individual citizen shall have the same privileges and powers, that the State has, in the prosecution of the oleomargarine law.

The enforcement of this law, is in the hands of the Dairy and Food Commissioner, and he is responsible up to the point that I have stated; until the case comes to court. Then his responsibility ceases, except that he is to produce the evidence that he possesses,

for the consideration of the court and jury. The matter is then in the hands of the jury, and they determine what is to be done.

This perhaps, clears up the question of responsibility. Begging the Chairman's pardon, I didn't say that we were "going to clean up the whole business at once." That would be a foolish expression for any man to make, when he knows that he is face to face with the courts. He is, however, responsible for bringing the evidence to the court.

One of the points of difference between the old and new laws, is, that under the new law, notice of the use of oleomargarine in any restaurant or hotel, must be put upon the counter where used. With the dealers, notices on the packages must be in full view. Under the old law they concealed them. The dealer, whether in the wholesale or retail trade, must keep a set of books showing the consignments of oleomargarine, to whom consigned and the railroad by which it was shipped. If a retailer, he is also required to show from whence the goods were obtained. The Dairy and Food Commissioner prepared, in accordance with law, forms of record books, and these were sent out to all persons applying for license. The Dairy and Food Commissioner now has authority to require, that the retailer or wholesaler shall open his books, if necessary, and show the extent of his business; from whence he received consignments, and to whom consignments are to be sent.

Another feature of the new law, is in regard to penalties. In civil prosecutions the penalties are the same in both laws, and in the first offence under criminal prosecution, in the new law the penalty is the same; but, when a second offence occurs, under criminal prosecution, the fine is more than double. Five hundred dollars is the least fine, \$1,000 is the maximum. Imprisonment is obligatory and is not left as before to the discretion of the court.

The new law, also, permits the Dairy and Food Commissioner to present, as evidence, before magistrates and in courts, a certificate, signed by himself and the Secretary of Agriculture, as to the fact of a man's having taken or not having taken out a license. Heretofore, it was necessary for the Dairy and Food Commissioner to appear in person and testify to this fact. It was exceedingly expensive, and often very difficult for him to be present at all hearings. Another feature is the injunction clause, which is intended to restrain the dealer from continuing the sale of oleomargarine pending a suit. This is virtually taken from the New York code. There has been no case brought under this injunction clause yet, for the reason that I will explain a little later. The lawyers were somewhat in doubt, as to just how the courts would determine this question. It does not follow, that because this is good law in New York, it is valid in Pennsylvania.

Another feature is the requirement of the constables, in reporting to the courts, to state whether they know of the violation of the oleomargarine law within their jurisdiction. This, at a first glance, seems an absurd requirement, because the ordinary constable is not competent, as a rule, to determine between a good article of oleomargarine, and butter, and so if he is to depend wholly upon his own judgment, he, perhaps, would not have a case to report once in a year. It is, however, far more reaching. He is required to report a case, if evidence is furnished him by anybody else, and if that case is found to be well taken, the judge immediately directs the district attorney to have it brought before the grand jury, and if a true bill is found the man is arraigned and the case put down for trial. This is a short cut into court and before the grand jury. If any citizen has a sample, of what he suspects to be oleomargarine, analyzed and the suspicions are confirmed, he can notify the constable, who must report it to the next sitting of court. Then if the man who has given information will appear with evidence the court will determine whether it is well founded, and if so must present it to the grand jury. This is, therefore, a very important clause.

Another feature of the new law, which was in the old, but not in as satisfactory form, is that any citizen can bring prosecution. Under the old law, this was done at his own expense; under the new the citizen receives half of the fine.

Another feature which is made quite prominent in the new law, is the right to enter a place of business and take samples. This is, however, of very doubtful legality. It is a dangerous thing to jump on a man in his own store, and the man who does it does so at his peril. We are, therefore, obliged to get samples by other means, than by going in and announcing the presence of the agent or the Dairy and Food Commissioner and demanding that the refrigerators be thrown open for his inspection. It is regarded as a very doubtful right, for him to enter and search. That feature will have to be administered with much discretion.

Q. Has that ever been tested?

A. It has been tested with the result that the dealer met the man with an axe.

The publishing of a bulletin semi-annually, by the Dairy and Food Commissioner, showing the suits and prosecutions that have been brought, is another feature in the new law. That report, is in the hands of the printer now. The report, up to the first of last July, will we hope, be issued in the very near future. Another will be prepared after the first of January, showing the suits and prosecutions, from the first of July to the first of January.

Now, then, what has the Department been doing? It is a great privilege, for those of us who are entrusted with the administration

of this law, who are on the firing line, to make a report to some of you who perhaps do not know what it is to be under fire. From the first of January, 1900, to the first of July, 1901, we have been enforcing pure food laws. The oleomargarine law is only one of a number that we have had to enforce. All the laws which the Department has to enforce are embodied in this bulletin and it will be sent free of cost to any one who desires it. In the enforcement of the oleomargarine law, during the past eighteen months, there were analyzed by our chemist, 1,402 samples of oleomargarine. There were, perhaps, 3,000 or more samples taken. A large number were found by the primary test, not to be oleomargarine. All the figures will come out in the bulletin. There have been a total of 3,019 analyses in the eighteen months. I will venture, that not three States in the Union, taken together, can match that in the way of analyses.

In the matter of prosecutions, immediately upon receipt of the analysis from the chemist, we institute suit, if the case is a good one, one in which the chemist can come on the witness stand, and swear that the goods are adulterated. We have had 1,159 oleomargarine suits. Many of you who have had one suit, have spent a lot of money, and had all sorts of delays. It takes a man with pretty good digestion and a clear conscience, to fight in this way, day in and day out. Our Dairy and Food Commissioner, is an active man. There are a lot of people engaged in the enforcement of this law, and they are, without exception, honorable, straightforward men, so far as we know, and we have many tests of the honesty and integrity of our agents and attorneys; tests that they know nothing about, but which satisfy us that these men are doing their work to the best of their ability, and under great discouragement at times.

Now then, what is the result? It is fairly satisfactory all over Pennsylvania, with the exception of Allegheny and Pittsburg. There we have come up against a peculiar sentiment that has been very difficult to deal with. A year ago we reported that a large number of people in Pittsburg had been arraigned. We have been endeavoring to get these people before the courts, but you know the methods taken to bring about delay. We have, however, brought 394 of them before the court in criminal suits. In every one the proof was absolute. Our chemist and agent appeared before the grand jury. They gave an account of every one of the 394 suits, but the grand jury ignored every bill; and, it did more than that, it put the costs on us, or it put the costs on our agent, not on the State, on our agent as an individual. I have the papers here, that show the protest that was made by the Dairy and Food Commissioner, against that action of the grand jury, and the petition to the court asking the judge to resubmit these cases to the grand jury, on the ground that the evidence was conclusive, and the verdict not in accordance with

the evidence submitted. The court, after holding the papers for two months, refused to grant our request, and the verdict of the grand jury was confirmed. We then had another petition made out to the court, asking that so much of the decision, as put the costs upon our agent, be reversed. This was refused. That was only a few days ago. The court immediately gave us notice, that our agent was to appear yesterday, in Pittsburg, for sentence. Our agent appeared; the judge was out of the city and the matter was deferred for ten days. At the end of this time, our agent must appear before the court in Pittsburg to receive his sentence. It is the purpose of the Department, when the sentence is pronounced, to appeal the case to the Superior Court, and if necessary to the Supreme Court. It is time to determine, whether a State agent, acting in the line of duty under the authority granted by the laws of the Commonwealth, is responsible for costs, in suits that have been ignored by a grand jury. We have gone as far as the best legal advice warrants.

We have also brought, in Pittsburg, 230 civil suits, and every one of these has been appealed, and they will have to come before the court whenever the district attorney is ready to list them. They are pending and we cannot urge the court, except to ask the district attorney to hasten the hearings. That is the situation in Pittsburg where public sentiment, as indicated by the action of the grand jury, is in favor of the sale of oleomargarine.

We have not the same difficulty in other parts of the State. Under the new law we have won every suit but one, and that was lost through an informality; that is, the dealer declared that his clerk who sold the goods to our agent was not authorized to sell butter or anything else except meat and so the matter went against us.

Q. What is the district attorney to do with a civil suit?

A. The civil suits are listed by the prothonotary for trial.

Q. When can this injunction clause be tried?

A. The injunction clause cannot be enforced until we have had a second case. A second case means that there must first be a conviction. Moreover, we do not wish to make a test of this clause in Pittsburg where the circumstances are not favorable perhaps to its consideration. We would prefer to have the trial where the judges and jury would be more likely to look at the facts as unprejudicial persons see them. We have, therefore, been waiting for an opportunity to bring a trial out in the country. In every instance, in which the people in the country have been prosecuted, they have quit business.

We have over 200 cases in the city of Pittsburg, that we are simply holding, until we see what we can do with the ones in court. It is useless for us to bring up new cases, if we cannot dispose of those

we already have. The cases lose nothing by pending, except that the people have taken a new lease of life, as it were, since the action of the grand jury.

The law is being well administered, I believe, in all parts of the State, except in Allegheny county and perhaps in Westmoreland county. Of course, that doesn't mean that there are no sales of oleo-margarine in other places, but that the sale is not openly carried on. There was a recent decision in a case in which much trouble has been given. Agents of western firms have been taking orders in the country, and having the goods shipped, as they supposed, under the Inter-State Commerce Law. The effort was to evade our law. Two men, however, were convicted and obliged to pay a fine of over \$200. I think there will be other similar cases.

The food authorities in the State need the sympathy, support and confidence of the citizens in their effort to administer this law impartially and faithfully. There have been some criticisms, by persons who do not know the facts, but the books of the Department are open to inspection, and an itemized list of suits and prosecutions will be published. Just how far we shall be able to proceed in the future, in Pittsburg, depends altogether upon the courts. We can take samples, but if we cannot get beyond the grand jury the Department of course is helpless. The members of the Pennsylvania Dairy Union can do a great deal to correct public sentiment, and to help the Department in its efforts to enforce the law.

Discussion followed participated in by Messrs. Paschall, Edge, Embree, Cope, Hamilton and McSparran.

SOILING AND SOILING CROPS.

By DR. EDWARD B. VOORHEES, *Director New Jersey Experiment Station.*

The growing of animal goods is particularly important at the present time. The various crops found to be suitable for soiling or dry forage will be considered from the following standpoints: Their usefulness in a system of continuous soiling; their adaptability for pasture and hay; and the advantage of their use in reducing the necessity for purchased feeds. Furthermore, a systematic growing of forage crops will result in obtaining a very much larger yield of food per acre, thus concentrating our efforts upon fewer acres and permitting a larger number of animals. The soiling system, however, has the chief advantage, of course, of providing a continuous sup-

ply of succulent food for every day in the year. The growth of forage crops, therefore, is advantageous, even for the man whose practice is to pasture, because these crops will supplement shortages due to drought or inadequate supply of food, due to the watery character of pastures during wet seasons.

The matter of the food in forage crops is also one which requires some study, owing to the variability of the crops, both in their content of dry matter, and in the proportion of the nutritious compounds contained in them. In the case of fine mill feeds, we have pretty full knowledge concerning their composition and nutritive value, and furthermore, the various mill products, as bran, middlings, etc., contain practically the same total amount of nutrients, varying only in the proportions and digestibility of each. In the case of green feeds, on the other hand, wide variations are likely to occur in the amounts of dry matter contained in them. For example, corn in the stage of maturity in which it would be most suitable for feeding, will contain 25 per cent. of dry matter, whereas certain of the millets and other crops, very desirable for soiling, oftentimes contain as little as 10 per cent. The ton basis of comparison, therefore, which is the usual basis, is not as safe a one as in the case of dry feeds of the same general character. This point of variation in the case of different crops should be taken into consideration, together with that other important one, namely, the influence of the amount and proportion of the different nutrients. It is now well understood, that those crops which belong to the cereal group, as corn, sorghum, millet, etc., are carbonaceous in their character, and if fed exclusively, if such a practice is ever desirable, does not give best results, but is wasteful, while the feeding of leguminous crops, exclusively, would result in supplying a much larger proportion of protein than is necessary or even desirable, which is also wasteful. In other words, the two classes of crops would be more economically used together, than if either were used alone. This line of investigation has also proved valuable in showing the possibilities of intensive farm practice. It has been demonstrated that for the climate of New Jersey, crops may be so arranged as to furnish a continuous supply of green forage from May 1, to November 1, and the yields have been sufficient to provide from one acre food enough for four cows for this period. This may not be possible in your shorter season, though I am satisfied that with a careful study of the adaptability of a number of these crops to your conditions, a very largely increased product may be obtained. The crops that have been found especially useful are discussed in the order of their use. The amount fed per day will range from fifty to as high as eighty pounds, depending upon the character of the forage, whether very watery or reasonably dry, and upon the supply; when a great abundance is obtainable, larger

amounts are given at each feeding, though in all cases when the forage is very young, or in the beginning of the year, smaller amounts should be fed, in order to get the system of the animal adjusted to the more succulent product.

Rye. The first crop to be of service in the spring is rye, which is usually ready for feeding the last week in April, and may be continued through the first ten days of May. It matures very rapidly after the heads appear, and can be successfully used for a period of from ten to fourteen days, if seeded at different times, and cutting is begun before it comes in head. Where it is not practicable to practice soiling, the crops may be pastured. This method, while more wasteful, is less expensive than soiling. It is very important to have a pasture crop at that season, because coming before meadow pastures are ready.

The crop yields well on medium soils, though it responds profitably to good treatment. It is recommended that it be seeded thicker than when the crop is used for grain; from two to two and one-half bushels of seed may be used with advantage on good soils. The fertilizers should be rich in available phosphoric acid. A fertilizer containing,

	Per cent.
Nitrogen,	3
Phosphoric acid,	8
Potash,	5

may be applied at time of seeding, at the rate of 200 to 300 pounds per acre. A top dressing of nitrate of soda in the spring, at the rate of 100 to 150 pounds per acre, is also an excellent practice, not only stimulating a more rapid growth, but increasing the content of nitrogen in the dry matter. When cut at its best stage, it is nitrogenous in its character, though it rapidly changes in this respect as it matures. On the average, the crop will contain about 23 per cent. of dry matter, and a yield of six tons per acre would furnish about one and one-half tons, with a nutritive ratio of 1.5, thus being in itself practically a balanced ration. It, however, cannot be fed as an exclusive ration, owing to its watery character.

Wheat. Wheat is also an excellent green forage, and ordinarily its use will immediately follow that of rye. It contains on the average a little more water than the rye, though its dry matter is richer in nitrogen. The seeding and treatment may be the same as for rye, though on the same character of soil larger yields of rye than of wheat may be obtained because of the greater foraging power of the rye.

Alfalfa.—Alfalfa is a perennial plant, and once well established will last a number of years, from four to ten, or more, depending upon the character of the soil, and the treatment of the plant in reference to manuring and method of cutting. It grows well on varying kinds of soil, providing the subsoil is open and porous; the most favorable is a rich, somewhat sandy loam, warm and friable, with a deep and loose or gravelly subsoil, well supplied with lime. A dense clay or hardpan subsoil is most unfavorable. Although a rich soil is preferable, alfalfa sometimes does well on poor, well-drained gravelly land. While the plant requires much water, it will not flourish where the ground is saturated or flooded. The soil should receive careful and thorough preparation—this is very important—in order to secure a full stand. If the subsoil is hard and compact, the subsoil should be used. For the climate of Maine, I should recommend experiments with the Turkestan variety.

The first cut of alfalfa should be made just before it blossoms. If left until in full bloom, the quality of the product is reduced; besides, the plants are injured, and subsequent crops are smaller. In good growing seasons the crop will reach the cutting stage in from four to five weeks. This crop is not only one of the most useful for soiling, but makes an excellent hay. The dry matter is very rich in protein, having a nutritive ratio of 1:4.3. As green forage or hay it serves an excellent purpose on a dairy farm, since its use will materially reduce the need for purchased feeds. In other words, alfalfa rations should include corn meal, or other starchy foods, thus enabling the feeder to more fully utilize the carbonaceous crops of the farm. Owing to its early development, its use for soiling follows in order, the rye and wheat; the first cutting last year began on May 19.

Crimson Clover.—Crimson clover is one of the most useful of our forage crops from the standpoints of yield, composition and cost, and the ease with which it may be secured. It is essentially a catch crop. It may be seeded at the rate of twelve pounds per acre, in corn or after a crop of early potatoes, without interfering with regular rotations. In fact, in New Jersey, corn and crimson clover crops have been obtained the same year on the same land, and for a number of years in succession. The corn and clover both improving in yield from year to year, without heavy additions of manures or fertilizers. It will, however, like all crops, make its best growth on good land. It serves also, where soiling is not practiced, as an excellent pasture, and may be also made into hay, though it is necessary that it should be cut before the seed matures, owing to the danger that might follow from the matured hulls forming a ball in the stomach.

The yields will range from eight to twelve tons per acre. It is more watery in its character than the crops already mentioned, as

it is usually necessary to harvest it in its early stage of growth, particularly if used as a catch crop to be followed by corn. A yield of eight tons of crimson clover will furnish as much protein as is contained in one and one-half tons of wheat bran, and, because of this nitrogenous character, may be fed profitably with corn meal. This crop is also highly nitrogenous in its character, the dry matter showing a nutritive ratio of 1:1.1, and may serve as the alfalfa to reduce the need for purchased protein.

No difficulty has been experienced in securing a catch of crimson clover at the Experiment Farm, and, with few exceptions, the crop has withstood the winter well; in fact, during the winter of 1899-1900, it proved more hardy than red clover. It may be that in cases where failures are reported there is a deficiency of lime, or of the mineral elements, phosphoric acid and potash. It is the practice at the farm, when breaking up the sod for corn, to manure, at the rate of eight tons per acre of an even mixture of ground bone, acid phosphate and muriate of potash, and the following years in the succession to apply 100 pounds per acre of a mixture as follows:

	Pounds.
Acid phosphate,	75
Ground bone,	10
Muriate of potash,	15

Red Clover, Alsike and Timothy.—Following the crimson clover, the red clover, or mixtures of red clover and alsike, or even red clover, alsike and timothy, are used, and mixed grasses of timothy, red top and Kentucky blue grass. These mixed clovers or grasses are familiar to all, and their character and feeding value well understood. These are also nitrogenous in their character, and for this reason are superior to most other crops, and may be used from ten days to three weeks or a month, depending upon the character of the plant mixture; the clovers coming earlier, and those having the larger proportion of grass serving to supply the green forage as late as the first week in July.

The yield of these will average about six tons per acre, though they are influenced, as the others, by the character of soil and season, and the grasses particularly showing a higher content of dry matter than the clovers. On soils where soiling is practiced, it is usually a good plan to seed in the early fall, when the crop, if well fertilized, will be ready for use in the following summer. An application of 300 pounds per acre of a fertilizer containing:

	Per cent.
Nitrogen,	1.5
Phosphoric acid available,	9.0
Potash,	5.0

is recommended.

Oats and Canada Field Peas.—The various varieties of peas are sold under the general name of Canada field peas, and can be obtained from most dealers. The oats should be the stronger growing varieties, the Clydesdale giving excellent satisfaction. This crop is one of the most serviceable in a forage crop rotation, because supplying food when other crops are not usually available. The crop may be seeded at intervals of from a week to ten days, making them follow in the order of their maturity. Hence, the first crop should be seeded as early as possible in the spring; it requires about two months from time of seeding to time of harvesting. This crop is better adapted for mellow loamy soils than for light sandy soils, though good crops may be produced on the latter if seeded early. On good soils two bushels per acre of both peas and oats should be used. The peas may be sown immediately after plowing, while the land is still rough, and harrowed in or plowed shallow, and the oats then drilled in or sown upon the harrowed surface. First cuttings, which may be taken just as the oats are heading, and, like the clovers, may be used to advantage without the addition of feeds, though owing to their watery character it is better to add small quantities of fine feeds to the ration. The yields will range from six to ten tons per acre—with us the average at the farm has been about eight tons, and this yield will furnish about as much protein as is contained in two tons of wheat bran. Where manures are freely used, say eight to ten tons per acre, a good addition of fertilizer may consist of 200 pounds per acre of an even mixture of ground bone, acid phosphate and muriate of potash. The crop responds remarkably well to the application of manure previous to or at the time of seeding, the soluble nitrogen in the manure promoting an early, rapid growth of both plants, which is a very desirable characteristic. This crop also makes an excellent hay, and while more difficult to cure than most hay crops, is not more so than alfalfa or crimson clover. It is richer than ordinary hay in protein, and if cut when the oats are in the milk stage, and the peas just beginning to form pods, it makes an exceedingly palatable food. The plant may also be allowed to ripen, then threshed and the oats and peas ground, when an excellent feed will be produced. The straw also serves as a good bulky food. A yield of two or three tons per acre may be obtained of the hay, and from thirty to fifty bushels of the grain.

Corn.—Following oats and peas, which may be usually fed until August, the early planting of corn will be ready. The corn crop is as a whole so well known that it is hardly necessary to discuss its merits in detail, except perhaps to emphasize the fact that if quick maturing crops are grown, two crops may be obtained the one season from the same land. One of the best varieties we have found for soiling purposes is the Thoroughbred White Flint, as it grows very rapidly and branches from the base, thus constantly getting thicker. The stalks are not so large and are succulent, and do not show so large a proportion of waste as is the case in some other of the larger growing varieties. It is advisable to plant it much thicker than is recommended for crops intended for silage. We usually plant in drills three and one-half feet apart, with plants from four to six inches apart in the drill. This is the first cultivated crop considered, though the extra cost is in part balanced by the cheapness of the seed.

For silage, no crop is superior to corn, and the larger growing varieties are recommended. At the Station, the Southern White has given the best results; it starts off vigorously ahead of the weeds and makes a large, rank growth, which ears well. It will mature for the silo, when planted after crimson clover, the last week in May or the first of June; when planted in drills three and one-half feet apart, and with the grain about ten inches apart in the drill, the yield will range from ten to eighteen tons per acre, containing twenty-five to twenty-eight per cent. of dry matter. Silage corn should not be cut until the ears are beginning to glaze, at which time it will usually contain the higher percentage of dry matter. If put in too green, the silage will not be so good and the losses due to fermentation will be greater.

The yield of corn, of course, will vary widely, ranging from eight to twenty tons per acre, though on medium soils and in a good season the average will not be far from ten tons per acre. This crop differs materially in its composition from those already discussed. It is carbonaceous in its character, the dry matter of the fodder, when cut at its best stage of soiling, showing a nutritive ratio of 1:11, or less than one-half as much protein in proportion as is contained in the clover crops.

Sweet Corn.—Many farmers believe that owing to the larger content of sugar contained in the larger growing varieties of sweet corn, that this crop would serve better as green forage than the field varieties. Stowell's Evergreen Sweet was tested the past season, and the results were not as satisfactory as those obtained from the White Flint, for while the crop was eaten more completely than the larger varieties, as the Southern White, it was no more fully utilized than in the case of the White Flint, besides the growth is much slow-

er, particularly in the early spring, and the yield of dry matter per acre was only about one-half as great as from the other varieties. For a crop that may be seeded in June for summer growth, it may be strongly recommended.

Barnyard Millet.—Barnyard millet is much superior to the ordinary German millet or Hungarian grass. It may be sown after rye, oats and peas, or other crops, at the rate of fifteen to twenty pounds of seed per acre, as early as May 15, or as late as August 15, and it will mature a crop in from forty to sixty days, depending upon season. If well fertilized, which is essential, the yield will range from eight to twelve tons per acre. In using this crop for either soiling purposes or for hay, it should be cut just before heading out, as it hardens very rapidly after heading, and is then unpalatable.

Pearl Millet.—This is one of the best of the millets, and different seedings may be planted, beginning with May 15, and continuing until August 15. It is one of the larger varieties, growing from eight to ten feet high when in full head, forming stalks something like sorghum, though it is a very succulent fodder. It should be seeded at the rate of four to six quarts per acre on land well prepared, in order to encourage rapid and complete germination of all of the seeds. It is a very rapid grower and will make a crop in from forty to sixty days. The yield obtained at the farm averaged twelve tons per acre. It is much more watery in its character than corn even, thus making the yield of dry matter less than would be the case from the same yield of corn, though it is quite similar in its composition, showing a nutritive ratio of 1:12.

For soiling, cutting should begin before it is in head, since as it begins to head the stalks become hard and unpalatable. All of the millets are surface feeders, and should be well supplied with available fertilizing materials.

The broom corn variety of millet is also excellent for soiling purposes, and its treatment may be the same as for the barnyard and pearl varieties. Broom corn millet will require twenty to twenty-five pounds of seed per acre, and the barnyard millet sixteen to twenty pounds per acre. The seed should be evenly broadcasted on a surface well prepared and fertilized or manured with materials rich in available nitrogen. A good fertilizer is one containing:

	Per cent.
Nitrogen,	5
Available phosphoric acid,	6
Potash,	5

Kaffir Corn.—Kaffir corn is a crop quite similar in habits of growth to the larger varieties of millet, and, while more leafy, is,

as a whole, less palatable. It grows in our climate from six to nine feet in height. It may be seeded in May, preferably in rows as corn, and cultivated; about ten pounds of seed is required per acre. The Kaffir corn have proved valuable in the southern and western sections of the country, owing to their drouth-resisting qualities, but cannot take the place of corn in this State. The yield obtained has been about one-half that obtained from good varieties of corn, though owing to the higher percentage of water contained in it, the yield of dry matter has been practically only one-third as great. Great claims are made for these plants in other States, as already intimated, yet thus far our experiments do not show that they can be verified here.

Teosinte.—Teosinte is a plant that is very highly recommended, particularly by seedsmen, and does make an enormous yield. It, however, requires a whole season, thus making it less desirable as a forage than the quicker growing plants. It is also very slow to develop in the spring, making it more expensive to keep clean on land reasonably weedy, besides occupying the entire season. It is a succulent and palatable forage; in fact, so watery as to make it undesirable from the standpoint of food produced. In our experiment at the station, when seeded at the same time and cut at the same time as corn, the dry matter in the teosinte was 9.9 per cent., whereas that in the corn was 21 per cent., or, in other words, one ten of corn would furnish as much actual food as two tons of the teosinte.

Sorghum.—Sorghum is another plant which belongs to the cereal family, and is also strongly recommended in some sections of the country, but where the other plants mentioned grow well, this cannot be recommended as superior. In the localities where the season is much longer, as in some of the southern and southwestern States, two or three crops are sometimes secured by cutting at early stages of growth, and allowing them to grow up again. This has been tried at the farm, and has not been found successful.

Cow Peas.—This is a leguminous plant that possesses many desirable qualities as a forage, and the longer our experience with it as a forage, the more can be said in its favor. Of the numerous varieties, the Clay, the Whippoorwill and Black are all well suited for soiling purposes. It is a crop the dry matter of which is exceedingly rich in nitrogen, possessing the advantage mentioned for the clovers in reducing the need for purchased protein. The plant will thrive well on light, poor soils, if an abundance of mineral elements are provided, though their best results are obtained on a warm, good soil. Seed should not be sowed until the last week in May or first of June, or until danger of frost is passed, and because of their more rapid

growth after the hot weather of summer sets in. In the experiments conducted in this State, they have been sown broadcast, though many recommend seeding in drills and cultivating as for corn. While this may be advisable on land that is very weedy, it has been our experience that the extra yield obtained from cultivation did not counterbalance the extra cost. They may be seeded, therefore, either broadcast or in drills. If broadcast, one and one-half bushels of seed should be used and well covered. If in drills, one bushel will be sufficient. The saving in seed is quite an item at the present time, owing to its high price. The yield will vary widely depending upon both the season and the period of time they are allowed to grow. If allowed to grow throughout the entire summer, yields as high sixteen tons may be obtained. If cut when they reach a good condition for soiling, from eight to twelve tons may be obtained. The cow pea, like alfalfa, is very rich in nitrogeneous substance, and, therefore, is more valuable pound for pound of dry matter than the corn or millets in balancing rations for dairy cows. The nutritive ratio is about 1:4, thus requiring a very considerable addition of carbohydrates to balance. A yield of ten tons of green forage per acre will contain as much protein as about two tons of wheat bran. Cow peas may be successfully made into hay, though requiring extra care in the handling.

Soja Beans.—This crop is quite similar to cow peas in its characteristics and habits of growth, and the recommendations as to seed, seeding and cultivation will apply equally well here. They are less palatable than the cow pea, owing to the hardness of the stem, which, as the plant grows older, becomes very woody. It also requires a little longer time to reach the right stage of maturity for use. Where cow peas can be successfully grown they possess all the advantages that would be obtained by the soja bean.

Cow Peas and Kaffir Corn.—An interesting experiment was conducted the past year, using a combination of cow peas and Kaffir corn, the idea being that the Kaffir corn, being a strong, upright grower, would serve to hold up the cow peas, besides securing a larger yield because of the two varieties of plants. The experiment was successful in so far as this particular purpose was concerned, though owing to the very dry season the yield was not as great as could be expected under average conditions. This combination is also very palatable, and because of the different character of the two plants, the composition of the dry matter is such as to furnish practically a balanced ration, though, as suggested in reference to other forage crops of a watery character, it will not be altogether a desirable practice to use them exclusively. When these are seeded together, one bushel of cow peas and twelve pounds of Kaffir corn would be sufficient. This field is a fruitful one for the experimenter.

as it is more than likely that other combinations would prove useful, as, for example, with field corn, etc.

Barley and Peas.—This crop was very useful for late soiling. Its field management is practically identical with that of oats and peas; it is not injured by light frost, and can be fed throughout the month of October. If the weather is cool and moist throughout August and September, nearly as large yields may be obtained as from a crop of oats and peas, but if the fall is dry and hot, the crop is liable to be very much reduced.

As has been shown by the discussion of the various crops suitable for green forage, they differ in the actual tonnage that may be secured per acre, and in the amount and character of the food contained in them. Hence, it is important to have actual knowledge in reference to the relative yield of food and its cost.

The following table shows the average yield per acre in tons, as well as the amount of nutrients secured.

Soiling Crops. Number, Kind and Average, 1901

Number of acre.	Crop Rotation	Yield per acre—Tons.	Nutrients.		
			Protein—Lbs.	Ether extract—Lbs.	Fiber and nitrogen-free extract—Lbs.
1	Oats and peas,	18.4	991.5	216.0	4,573.1
2	Cow peas and Kaffir corn,	18.4	991.5	216.0	4,573.1
3	Oats and peas,	16.8	691.7	216.0	4,573.1
4	Cow peas and Kaffir corn,	16.8	691.7	216.0	4,573.1
5	Wheat,	21.0	1,119.2	213.2	5,731.1
6	Barnyard millet,	22.7	1,243.4	308.1	6,435.2
7	Wheat,	19.3	642.5	122.2	3,872.1
8	Barnyard millet,	15.1	683.2	122.2	3,866.4
9	Rye,	21.7	1,893.3	354.1	7,011.3
10	Soja beans,	9.1	290.3	112.8	3,611.2
11	Barley,	11.3	810.6	166.8	2,280.8
12	Rye,	18.7	624.7	199.2	5,610.0
13	Sorghum,	19.2	958.8	214.8	4,284.0
	Mixed grasses,				

DISCUSSION.

Mr. Willets: Is not the cost of labor in connection with the peas and Kaffir corn a large consideration?

A. It is a very considerable item, yes, sir, but there are compensations.

Q. My cattle have been constipated ever since I have had the silage. What is the remedy?

A. I have had no such difficulty. With twenty-five per cent. of dry matter I have seen no trouble of this kind. I feed cottonseed oil when there is not so much of the alfalfa or moist hay. We feed with cornstalks and hay as a change more than for anything else and then balance up with feeds. I have used buckwheat middlings this year, which we get in New York State.

Q. What is the price?

A. Twelve dollars a ton.

Q. Do you find the flow of milk as good from silage as from pasture.

A. We have no pasture, so I cannot compare the two. We are able to get a continuous flow of milk on silage.

Mr. Embree: Whenever I changed the cows from silage to fresh pasture I felt that I had an increased flow of milk.

Q. Perhaps you do not give them enough?

A. They are given all they can eat.

Professor Voorhees: I think if there is difficulty with soiling it is because it is not the right kind. These cattle are turned out and given an abundance. They sometimes get seventy-five to ninety and sometimes sixty pounds a day according to the amount and as we understand what the dry matter would be in it. Under those conditions they are up to the full flow of milk.

Q. Would you advise running all crops through the cutter?

A. I think not. I do not see the real advantage. When the weather is dry we put fodder on the floor.

Q. Do you issue a bulletin?

A. We issued only one bulletin two or three years ago. It has not been brought up to the present time.

Q. You say the price of buckwheat is \$12 a ton; some years ago we had a buckwheat in our State that was really buckwheat. Now it is largely mixed with hulls, a great many of which we find in buckwheat middlings at \$20 a ton. Two or three years ago it was sold at \$15 per ton. Do you find much of the hulls in that which you get from New York?

A. Not much; perhaps fifteen to twenty-five pounds in a hundred pounds.

Q. What per cent. of protein has the buckwheat?

A. About twenty-four per cent.

The discussion of Secretary Hamilton's address was then resumed participated in by Messrs. Edge, McSparran, Sharpless and Embree, after which the following resolution offered by Mr. Maloney was adopted:

Resolved, That the Pennsylvania Dairy Union learns with regret of the non-enforcement of our pure food law in Allegheny county of this Commonwealth, owing to failure of the courts to act, and pledges

its earnest support to the Secretary of Agriculture and his agent the Dairy and Food Commissioner in the hearty and honest enforcement of our present pure food law.

The motion on Mr. Maloney's resolution was seconded and carried.

Mr. Embree: It is very important that we stand together for support. For the final satisfactory issue we will probably have to wait for years. It is a great deal better if possible to unite our forces than to divide them. I hope all who are here will use their influence in support of the law.

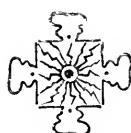
Professor Hamilton: I hope the Pennsylvania Dairy Union will do all that is possible to support the Grout bill that is to come before Congress. It will require the vote of all who are interested in the making of good butter in our several States. They are powerful influences opposed to it, but I believe it is possible to have such a law enacted.

Mr. Thomas Sharpless: I want to say that while I believe our oleo-margarine laws have not been enforced as well as they should have been, I have no reflection to cast upon the sincerity of either the Secretary of Agriculture or our Dairy and Food Commissioner.

On motion, adjourned.



PAPERS SELECTED FROM THOSE READ
AT
FARMERS' INSTITUTES
DURING THE
SEASON OF 1900-1901.



SCHOOL LIBRARIES.

BY LIZZIE FLEMING, *Shelton, Pa.*

READ AT PARKWOOD INSTITUTE, INDIANA CO., DEC. 4, 1900.

The first and most important point to be considered on this subject is the benefits derived from school libraries. Of the innumerable benefits which may be derived from the possession of libraries in our schools, I wish to mention a few of the most important.

Many children will acquire a desire for reading who otherwise may never have that opportunity elsewhere. And by so doing they have advantage of the grand opportunity of becoming acquainted with the standard literature; and this should be regarded as one of the greatest advantages which can be offered to any child.

Reading matter outside of our regular school text-books serves as a recreation when pupils become wearied with the regular routine of lessons. And if the precious moments sometimes spent in idleness were occupied in reading good literature the desired effect would be keeping the minds of the pupils continually employed and thus produce the tendency of their becoming more interested in their lessons, because "we grow by doing."

The ideas conceived by children and the impressions made upon their young minds is what, to a great extent, determines their success in future life. We have many examples given to prove this statement, of children by reading the biography of some noted character, have, themselves, been induced to lead noble lives.

There is nothing which cultivates the mind to such an extent as literature. Literary culture enables man to avail himself of the achievements of genius struggling with the inertness of matter, or fettered by the restrictions of ignorance and barbarity. It brings all his noblest powers into action, multiplies and refines his enjoyments, gives him the habit of wishing to find out the good and beautiful in everything that meets and surrounds him, and clothes him with a fictitious strength, as great as that which has been conferred on him by nature. It gives room for the exercise of that faculty which is to increase the skill of the physician, guide the speculations of the merchant, prompt the arguments of the lawyer, make the sermon of the minister palatable and nutritious, and, in reality, there is scarcely any branch of business in which the cultivated mind does not excel. Thus it is reasonable to conclude that literary culture

when conducted in the proper channel has the power to confer lasting impressions on its possessors. And no better method could be called into service to produce this effect than to possess libraries in our schools.

Perhaps there are few persons who ever stop to consider the immeasurable value of books. Let us pause for a moment, to think that by one motion of the hand the most remote regions of the earth may be brought to our view; that we may learn of events which have occurred centuries ago; and that the whole world's history moves in solemn procession before our eyes. Science, art, literature, philosophy—all that man has thought, all that man has done—the experience that has been bought with the sufferings of a hundred generations—all are garnered up for us in the world of books. And what a grand opportunity so many persons are deprived of by not having access to those precious gifts through our public schools. And think what a magnificent effect has already been produced upon the development and civilization of our country since the introduction of the art of printing; that books and not kings are to rule the world. Think for a moment, what an important element literature was toward the abolition of slavery. We may take, for example, that one noted literary volume, *Uncle Tom's Cabin*, and think how the influence of that one noble character, Harriet Beecher Stowe, was spread abroad throughout the land. What other means could have been called forth that could have produced such a vast influence on the minds of the American people?

The second point worthy of consideration is the need of libraries in our schools.

One of the great effects of not possessing school libraries is, that a great many children are deprived of the opportunity to secure good reading matter. For if they are thrown upon their own resources to secure literature, they may unconsciously drift into the habit of obtaining and reading trashy novels. While by the possession of libraries in our schools, children would be relieved of such temptations and the attention of their minds directed to an elevating and refining class of literature. Thus, there would decidedly be many an innocent young life rescued from destruction.

Our mere school text-books are not sufficient means by which children may acquire an education. They are simply only guides to direct their ideas in the proper channel. Hence, the deficiency can in no other way be better supplied than by good reading matter, exclusive of our text books. Because a pupil after having become interested in literature will realize the result of his text-book knowledge, and thus have a greater desire to increase his learning.

If the habit of reading is not learned in youth, it may never be learned. And the effect of the negligence of this habit is realized by

many individuals who cannot enjoy the boundless pleasures of a good book when they have the opportunity. The habit of reading is one which should be learned by every individual, so that in any experience which they may be called to realize, they may still have dependence on that one companion, a book. For he that is the possessor of a good book is not alone or deprived of all the pleasures afforded by this busy world.

The greatest care should be taken in selecting school libraries, in order that their contents may be within the comprehension of the pupils. They should be a practical and helpful part of the equipment of the school; interesting and instructing along proper educational lines. The classes of books should range according to the grades of the pupils because books which would be attractive and instructive to one grade, would be uninteresting to the others. But the contents of all school libraries should be based on books of an historical nature.

Means should be used to obtain the much-needed libraries in our schools. We should try to impress the idea upon the minds of the parents of the vast importance of school libraries, and if interest could be aroused in the citizens of the various districts, similar effects would be found to exist on the part of the school board.

The subject in discussion may meet with much opposition, such as a lack of time in our public schools for any time to be devoted to such resources, or if pupils become interested in the library, the result would be deficient interest in their text-books. But if conducted in the proper channel, the effect would be wholly in the opposite direction. Perhaps the cause of this opposition is on account of people not realizing the importance of the matter. But this is an important subject and deserves thoughtful consideration. And if this subject be treated in the proper manner, the result will be the possession of a library in each of our district schools.

THE BETTERMENT OF RURAL SCHOOLS FOR THE BENEFIT OF THE FARMER.

BY JOHN J. HELLMAN, *Walberts, Lehigh County, Pa.*

I shall by no means endeavor to say that the rural schools of our State to-day are not good. All my purpose is to reason with you and explain some few facts which might be done under the conditions now existing, and finally explain my own opinion of rural schools. All, however, are agreed that in rural schools, ungraded as we have them largely to-day, no satisfactory work can be done.

In viewing the public school system of our State, it is observed at a glance that it was brought about by agitation. The Puritan settlers of New England built the school house by the side of the church. Their first schools were, however, free, in part only, and to those who had contributed to found them. It was similar in our own State. Within the recollection of some of you the school house stood beside the church, and few school houses were found at places different from the church. This was the public school system of Pennsylvania but 65 years ago; public to such only who contributed towards its building or who paid a regular monthly tuition. By agitation our legislature founded the free school system and regulated its course of study and term, first, four months, then five, six, now seven months, a year.

Within the recollection of all of us, each pupil was obliged to bring his or her own book; and it is of that period, when there was six months school and each pupil obliged to furnish their books, that I shall refer to once more, later in my talk.

The law at present is compulsory for the smaller children, but is it not true that most of your grown children only go to school until they are fourteen to sixteen years of age. I have always pleaded with parents on this account, because it is that period of life when their minds are actively developing their higher powers namely: Conception, judgment, reasoning. And it were far better could that development be done in school rather than, perchance, in the street or public place. A teacher is expected to be a man of some intellectual attainments, higher than his pupils. This, too, is the period of life when some occupation for life is to be selected, and again I would state, it were better to choose wisely and thoughtfully than simply in a careless way. Send your pupils longer to school than you do now, and you will better the condition of the common school.

Send your children more regular. That is when they enter in the fall let them go to school every day. They are the only pupils that make good progress. Fortunately, my own district is such where it seems to me parents realize this truth, for our percentage averages 96 per cent. in attendance, including sickness. Take advantage of the seventh month recently added to the length of the term. You pay the tax, therefore, let it not be an idle tax, but use it to its utmost. Send your pupils more regular to school and you will aid the schools and benefit yourselves.

To-day a child comes to school and is there furnished with all the necessities. When you and I first went to school we had to bring our own books. I will not raise my voice against the free text-book system, for I think that all of us by this time realize that it has many good results; but I want to warn you parents against a new

danger on yours as well as on the teacher's part. When books were bought by individuals, I personally knew children, whose parents had but limited means, or perhaps little realized the value of the book to be bought, who had to work a day or two away from home or else had to do extra jobs at home in order that the purchase might be made. Do you not know that those things which you earn with your own toil are the dearest to you? Those are the things that you prize most highly. I see clearly that under these conditions, that children studied harder, naturally, than they do now, and you (parents) encouraged it. At present when a book is worn out the pupil knows that a new one is replaced and the township pays the cost. It also seems to me that parents are becoming more negligent about the matter. Parents can better the public school by helping to remedy this. The book no longer is the true property of the pupils, and something must take its place in order that the pupil will work as hard as before. What can be done? Give more encouragement as a stimulus to self-activity, which is the basis of knowledge. Have a closer watch as to what they do with their books. Give them to understand that the knowledge derived from studying is worth more than the value of the book.

The establishment of school libraries seems to me, characterizes now a refined school. Do you not know that a true school goes beyond the walls of the building so far as its influence is concerned? Are you now not applying that which you learned or have laid the foundation to learn in the public school? It is not quite so bad in the rural districts that children will loaf about the street or public stations; but still I think all will agree with me that if we can hold our children at something useful the effect is only too marked in years to come. The saying has it, "Show me your company and I will tell you who you are." Let me modify that statement just a little for this evening and say, "Show me the books you read and I will tell you who you are." You who are farmers and patrons of same school, see to it that there is a library in that school and you have helped towards the betterment of that school. A school library has a special advantage to the farmer, for you also have the opportunity of reading the books. Therefore, I repeat with emphasis, help to establish such a library in your school, if one does not already exist. See to it that books on agriculture are placed in your library and read.

You ask what are the advantages of such a school library, as I can buy the books and keep them at home, then they are mine? But considering the other side, if you buy a book and your neighbor buys one and placing these books together you can have the opportunity of reading twenty books for the payment of one. Thus the advantage is plain.

Be interested in your school. I can point you to school district J in which not one of its patrons visits the school, not once during a whole term; not even so much as seek after the welfare of their children. A good teacher desires to work hard, but he also desires that the work he and his pupils do is seen and honored. Therefore, it is a necessity that you visit your school, at least once a year, and often seek information concerning its course of study. Do this and you are taking a step that will elevate the coming race.

Let me give to you my own private opinion of rural schools and the manner of carrying them on. Not all of you may agree with me on this point. This, you know should be a free country, and every man should have the liberty to think as he pleases. So if you do not agree with me in regard to the matter it will be all right, and remember it is only the plan of one peaceful, law-abiding, patriotic citizen of this Commonwealth who makes it. To those who do agree with me, I ask to discuss this question much in the future, for I am positive that it is for the betterment of schools.

All of us are feeling that it is about time that some things on the subject of agriculture are taught in our rural schools. If one-half of the people of the United States are farmers and are engaged in agricultural pursuits, it is but reasonable that one-half of the education acquired in schools should have direct bearing on that occupation and especially in rural districts. You hear much of graded schools and township high schools, and I believe in them myself. But the chief objection to graded schools not centralized, is the additional expense they would bring, in that a new house with apparatus and additional teachers must be paid.

Take for example, South Whitehall township, for this is the one that I am best acquainted with, not that the same plan could be carried out in any other township as well; but I want to prove to you that with a slight additional tax there could be furnished a graded school for all children of this township. Our school tax last year according to statistics was .0015 on a dollar. Let that be increased to .0025 on a dollar and all the expense that I am about to make can easily be met. The valuation of our township, upon which the school tax is based, was in 1900, \$1,357,651. Thus it will be seen that at the rate of .0025 on a dollar the tax would amount to \$3,394.12 per annum plus \$582 poll tax, and our State appropriation, which was \$2,409.42 could be increased to \$3,000, thus making a total annual income of \$6,976.12. The aggregate cost of our thirteen school buildings in the township, including land, is \$33,800. If we would centralize these schools, with less capital, they could all be accommodated in grades. A building in the centre of the township to accommodate all its school children, could be erected with a cost of from \$15,000 to \$20,000. In this building we should have about seven

grades and employ a teacher for each grade. Our teachers' salaries last year was \$3,733.75, fuel and hauling \$299.88, repairs and labor \$63.89, hardware \$20.17, lumber \$57.40, total, \$4,175.09.

With this plan the great question is how to get our children to some central location. With wagons this would be indeed a tedious and expensive task; but with the advance of trolley roads I think it is feasible. Examine our township and you will notice that there is an electric road running very near three of its four borders. With six miles more track in the centre of the township our pupils would have better accomodation than they have at present. I believe if the company were assured to carry our pupils they would built the track. I also believe they would convey our children for single fare round trip. Thus, with an average daily attendance of 400 pupils, which is about the number we have, would make a cost of \$20 daily, and for 110 days would be \$2,800. The salaries for seven teachers at an average of \$60 a month would be \$2,940, the fuel to cost \$160, the hauling \$40, repairs \$100, a janitor \$200, or a total expense of \$6,240.

In such a school you would need but six or seven teachers, who can do better work than the fifteen at present. There is a bill in the legislature at present requiring the establishment of a township high school and also provides for the conveyance for pupils. This alone costs half what such a school would cost in that it requires an additional building and teachers. I say better make a whole job than half of one. This, too, would place us out of the grasp of the law for at least 50 years; as we do no more than what is law and that which we do is simply because it is law.

We want graded schools, we want township high schools, and we want agriculture to be taught in our rural schools. This is the cheapest way that I see. Here the pupils are in grades from the lowest to the highest, here is a township high school for advanced pupils, here is an opportunity to teach agriculture to our pupils, and here is a school that furnishes to our country children all the advantages a city school can have and we can yet enjoy this blessed distinction that our children are healthier than those of a city, and the results in turn be better.

You have noticed that this would necessitate an additional mill to our school tax. To this many will raise objection; but considering the other side of the question, our .0015 tax rate is at its end. Please do not grumble if the school board raises the rate, as it can no longer get along with the present. In this township, out of necessity, a graded house may be built next year. This will make an additional yearly expense. I also leave to yourselves to decide which you consider the cheaper school, the one we are having now at .0015 tax rate, where anything but perfect work can be accomplished, or an

ideal system furnishing all advantages necessary toward good results with a tax rate of .0025.

You may also object to this enormous sum of about \$20,000 to procure ground and erect a building. Say that only \$4,000 could be realized by selling our old buildings and grounds, it would reduce the debt to \$16,000.

When you examine the past you will notice that we are building a new school house every three years. Thus having as we do in this township thirteen buildings, it will bring one round once every thirty-nine years. Examine this matter and you will find this truth.

We could pay off on this new building at the rate of \$1,000 a year, thereby not increasing our building tax, the new building would be paid in nineteen years. This could stand good thirty-nine years as well as one of our present buildings does and we would not be pressed with a building tax for twenty years.

Philips Brooks has said: "If a man wants to be as good as his father he must be better." That is if a son accomplished nothing new, or in other words if he has no inventive genius outside of what his father had he remains on the same plane, and therefore has done nothing for the uplifting of himself and mankind. The first settlers provided a tuition school for their children—all they could do. Later, the free school system was provided, furnishing schooling for all children, both rich and poor. It is time that the present race will also do something for the coming generation better than our fathers provided for us, lest we and the children going to school to-day will remain on the same plane, not to be raised higher.

This plan to me seems a very good one, and if you think so, see to it that not another school house is built separately, but save that expense and if you have within yourself that fire, like patriotism, in love for the coming generation, use it to this end.

OPPORTUNITIES OF COUNTRY BOYS.

BY CORA MAE HOFFMAN, *Bedford County.*

There used to be a theory that the boy who happened to be born on a farm was of all persons to be pitied. Fate had nothing in store for him so the world thought, except to dig in the ground, and stick to the hoe, his body became as crooked as a gnarled oak in order to wring a living from Mother Earth. Since then the farmer boys have proven that they can take their true places in life, and not only take them, but hold fast to the possibilities which lie so thickly about their pathways.

This theory never had a foundation at all. Although we must confess that a few of this intelligent generation denounce the farmer boy or girl. It was a most wretched thing to throw at a boy that he was branded for life as a nobody, because he happened to be the son of a farmer.

Let us see what farmer boys have done for the world and for themselves. Here is a boy born of very poor parents on a farm back in the wilderness. If ever fate seemed against any one it did against this boy. But he had the will to do great things and all alone he set out. Working on the farm in the summer and winter, going to school in the spring and by teaching a term or two of the district school he worked himself through a three years' course at the academy. Then he entered a newspaper office and began setting type. At first he received simply his board. Soon he proved more valuable to his employer and was moved to the reporters desk. From that point he went on rapidly. A few years later he occupied the chair of the editor of one of the leading papers of the county. After he represented his township for five years on the board of supervisors, the law making body of the county, he was promoted to the State Legislature, filling all these positions with honor to himself and to the satisfaction of his constituents. But he did not stop here. He returned to the county, bought a farm and converted it into an ideal country home, where he could live in peace and still be one of the leading citizens of the State. Can any one say that, this farmer boy has proven to be a failure? This is one of the thousands of successful farmer boys.

Abraham Lincoln, that great, whole-souled man, was one of our very poorest farmer boys. What a noble character to place before our children of to-day. "Charity in every one of its beautiful meanings pervaded him; not only in the moral sense of all pervading love, but in the intellectual sense of comprehending sympathy was charity his guiding light." He was called to fill the most responsible gift of the people, and he did his duty faithfully and well.

In the Legislature of the State of New York in 1898, sixteen farmers sat as law-makers, and they represented the very salt of that body. Their hands were free from the touch of corruption and their sound, good judgment caused them to be sought by those who might have been supposed to be far higher in the social scale.

There will be more farmers in public life when our people come more fully to appreciate their sterling worth. Is it worth while for a farmer boy to get an education? Forever, yes. The best farmer is he who has the best all-round education. For such men the world is longing. The farmer of the twentieth century must and should know something about all kinds of business. He will when he finds of what incalculable value it will be to him to possess such knowl-

edge. How can the farmer boy do all this? By doing to-day the thing he can do faithfully and well and reaching out for the next higher thing.

Lastly, I would say to the farmer boy or girl, get an education. Emerson says: "No man can learn when he has no preparation for learning, however near to his eyes is the object." It takes conscious effort to so fit ourselves that we may receive the highest and best. "Daily must we think and learn; daily must we commune with nature till old things become new; that is are seen in a new light."

EMPHASIS IN FARMING.

BY JAS. P. MCCALMONT. *Paris, Washington County, Pa.*

We take it that "emphasis in farming" means that the farmer should engage in his calling as does the successful professional man in his, or as the successful merchant, mechanic, or banker, engages in their line of occupation, giving every phase of their business, care, thought and energy.

The idea that muscle is the only endowment necessary for successful farming has been long since exploded. True bodily strength in any calling is a valuable adjunct and combined with thought, care, and energy, will give reasonable success. The old time farmer with practically virgin soil to produce his crop had less need for studying questions of profitable farming than the farmer of the present day. In my earliest recollection the average farmers' outfit consisted of a team, wagon, plow, harrow, grain cradle, mowing scythe, axe, hoe and mattock, and costing altogether about \$200. At the present the average farmers' outfit costs many times that amount and the wear and abuse of this costly outfit largely determines the success of the modern farmer.

We are wont to compare the past condition of the farmer with the present and mourn for the prosperity of the past, but would we be willing to accept the deprivation of our fathers? We as farmers don't want to go back to the days of our fathers nor do we as a nation want to go back to the old days of Thomas Jefferson.

We do want the persistence of our fathers, and as a nation the rigid honesty of Thomas Jefferson in high places. We do want as farmers and citizens, to meet the trials and difficulties of the times in which we live. To sit, figuratively, on the fence and howl will not remedy a single evil. We do not pretend that the farmer is in an

era of prosperity. On the other hand the boom that has stirred other branches of business has not reached the farmer to an appreciable extent.

Perhaps the cause for this lies with ourselves. We have let our farms and our live stock run down and we were not in shape to benefit, but we had to buy, instead, to stock our depleted farms. We can look over the country and in every community there is a farmer here and there that is fairly prosperous. He has all the conditions to meet that we have. Low prices prevail with him as with us, yet by good management and care has come through it all and the verdict of the community is "he's a lucky man!" It was not luck; it was pluck, intelligent, careful management, a combination of brain and brawn and faith that proper means will gain the end that makes him prosperous. Making and storing dollars is not the main object in any man's life. "What we shall eat or what we shall drink or wherewithal shall we be clothed" is not the only disturbing thought. We must eat and drink and we look better properly clothed, but quantity and quality of either must depend on our ability to provide.

The farmer then should produce all he needs to consume on his farm and this without regard to prevailing prices. In this sense we must be what we would call general farmers. It is a bad practice for a farmer to buy anything he can raise.

In connection with this he may follow special lines of farming and stock raising or fruit. These are matters of adaptability to be determined by location and conditions. We must feed our farms or they will not feed us. Here is where the general farmer has the advantage of the specialist. The more products of our farms are consumed at home the more plant food we can supply if care is used. In our day advancement in all the avenues of life, is the rule. Trade and commerce and the means of moving the products of the earth are making mighty strides. From decade to decade we are filled with surprise at what has been done. Are the farmers keeping pace with this mighty advance? Can he keep pace with it? We enjoy very many privileges and comforts that our fathers never dreamed of. We must expect to pay for them. Our children, in the nature of things, will enjoy greater. On us devolves the duty of educating them for it.

The production of crops will avail us nothing if we fail to care for them. Nor will it in the long run avail if this production is at the expense of the soil without returning in some way the elements removed. This is one of the economic problems we must solve. How restore this lost fertility to the soil? We can figure the cost of an acre of wheat. The estimate ranges from ten to sixteen dollars. Suppose we say the cost is twelve dollars. Taking the crop average

of our State as reported by the Department of Agriculture, the farmers of Pennsylvania must sell their wheat crop of 1900 at seventy cents per bushel to obtain first cost. The farmer that raised twenty bushels had a small profit for his labor. This is discouraging, to say the least. How are we to remedy this state of affairs?

There are two ways; either increase the average or reduce the cost. Can this be done? I was helping a neighbor to thresh who had given his son the potato and truck patch for wheat. We threshed that first and the boy had thirty-seven bushels on what was supposed to be an acre. We cultivate too many acres as a rule. It was the thorough cultivation that produced this result and if we would give all the labor and care and fertilizer to fewer acres we might have greater profit or give the greater acreage the same proportion to amount of labor and care. The tendency of institute discussion is, in a measure, idealistic. We love to picture things as we would like to have them and sometimes, I think, we love to complain and magnify the supposed or real evils that confront us. We fail to discuss the everyday practical questions or suggest practical remedies for the real difficulties. "The fear of man that bringeth a snare" deters, and "let him that is without sin cast the first stone," makes us unduly modest in giving the real reasons for the conditions existing.

Nor is it conducive to one's popularity to do so. Few of us graciously submit to censure, however conscious we may be of short comings. Slovenly, careless farming, careless in improving even our limited means of education, so that in education, in social standing and in other conditions we are unfit to cope with others though they may be engaged in less honorable occupation than we. We are only fitted for the position we occupy shouting "prosperity, prosperity, monopoly, imperialism, or 16 to 1," as our several party bosses dictate. Wherefore should a living man complain for the punishment of his sins? There is no more honorable occupation, none more ennobling; but by careless indifference to all that goes to make lives of usefulness, we have clung to the traditions and customs of our fathers who in their day and generation were wiser and better than we, while the rest of the world have passed on. They have set the pace in the race of life and we are plodding along behind. This is plain, hard truth, humiliating as well, but who will successfully deny it.

What is the remedy? One will say we must have legislation. Yes, proper legislation that is the remedy for us. A new department, a few more offices to be filled by some one useful to the dominant "boss" the only qualification necessary for the position, obedience to party dictation. Another will say we must organize. "A wheel within a wheel" with all its concurrent cost.

I do not claim that these may not help to solve the problem, but

I do say that any permanent relief must begin right at our homes. Can we ask for legislation or invoke the power of an organization that we may continue our indolent, slipshod manner of farming. The one occupation by nature, the noblest, most independent of them all, but allowed to be subservient to all! Fellow farmers, ought such things to be? After all is our position in life as bad as we imagine? Have the occupations of others immunity from ills? Are there not failures in the financial and commercial world as well? Do we magnify our calling and make it honorable as by holy writ we are commanded to do?

In the varied soil productions of this great nation, it appears almost impossible for the great agricultural interests to unite or agree on a policy beneficial to all. Probably, selfishness is the real cause. The sugar producer demands subsidy and protection for his interests. The same desire is found in producers of cotton, tobacco and wool. Others ask protection for all raw production. Then comes the manufacturer demanding free raw material and almost prohibitive protection on the finished material. For these reasons we cannot expect soon to obtain relief by legislation. Bringing all these varied interests to a common view for the common weal of all the people have practically failed. To "live and let live" is relegated to future generations.

Then the farmer is called to face present conditions. The prosperity of the nation depends on the farmer. The world must be fed and clothed. Some time conditions will change then who will profit most? The man who has neglected his farm and stock or the one who in face of every difficulty has labored to preserve the fertility of his soil and has intelligently bred his stock in the line of farming best suited to his locality. Many of us are having free mail delivery. Think you that this is the free gift of a fostering nation! By no means, directly or indirectly, we must and ought to pay for it. It will be the same with the telephones, and contemplated trolley lines, a great convenience, but to enjoy them we will have to pay for the privilege. Is it not devolving on us then that this time saved may be devoted to our farms, to the improving of our minds, to the mastering of business methods in conducting the business of our farms and greater care not only in increasing the production but in caring for it when produced.

I do not wish to appear before you as one that has attained the high pinnacle of success and thereby have the right to criticize and instruct others. On the other hand, I stand here in full consciousness of failure in the past in many ways. The experiences of mature years in farm life teaches me of grievous mistakes in judgment, in methods in the business of my calling. It is because of these that I dare to lift the warning voice. If the experiences of a life journey of

fifty-eight years does not give the right to instruct, it surely does give the right to warn. Conscientious desire to performance of duty has been my inspiration and if a thought given shall inspire one to faithful effort it will not be in vain. There is a spirit of criticism among us that neutralizes, if it does not destroy, our most earnest efforts.

Let us then strive to fulfill our destiny here. A wise providence has given us a goodly heritage. For its use or abuse we will be severally held responsible.

THE DIGNITY OF FARM LABOR.

BY MRS. VELMA WEST, *Bear Lake, Pa.*

READ AT COLUMBUS INSTITUTE, WARREN CO., Jan. 31, 1901.

Perhaps these few thoughts should properly have been headed, "How can those engaged in farm labor be led to better appreciate its dignity and beauty?"

It seems that too many maintain a discouraged and apologetic attitude before the world, instead of standing upright and being loyal to the most ancient and honorable calling, by respecting their vocation, making it honored by others. In any of the various occupations in which men are engaged it is difficult to make a success unless the worker is in harmony with the work, indeed we may safely say that it is absolutely impossible to attain to the highest degree of excellence, without a love for the work and a pride in it, a feeling of joy and thankfulness that he is permitted to do this in which his soul delights.

This feeling is essential to the highest degree of success that our human faculties are capable of reaching. In most callings, we find the majority of the workers pleased with their position in life, and not averse to advertising their business wherever they may be. When you find an assemblage of those in different lines accidentally thrown together and in the course of their conversation they compare notes, you will always find the mechanic, the merchant, the banker, the electrician, the teacher, the lawyer, all eager to proclaim the advantages of his respective callings over all others; you will find only one, who, as the talk rolls on, seems to shrink until he can scarcely be found when the fatal moment arrives that he is questioned, and he is just able to gasp that he is "only a farmer."

We often hear farmers speak more slightly of their occupation than we ever hear those in other classes speak of it. This is not

true of all farmers, but we would gladly hasten the day when it will be true of none. The conditions that have surrounded farm life in the past have, without doubt, had much to do in bringing about this feeling; but have not those conditions changed sufficiently to enable the farmer to engage proudly and happily in his work? His isolation from society, and lack of opportunity for reading and culture had a tendency to place him at a disadvantage which he keenly felt; but now, in the thickly settled eastern country, at least, there are few who cannot enjoy the society of cultivated people—while the low price of the very best reading places is within the reach of nearly every family; that is a sufficient quantity of it to make each member thoroughly conversant with the leading subjects of the day. And not only that, but each is enabled to take a course of home study in any particular branch which has a special fascination for him.

Again, there is no other class of workers who have in the past, taken up their life work with so little preparation—so little special training for it; so few have considered farming as a science—to be placed on a par with other sciences, and studied accordingly; the causes that produce certain results followed up as closely as the laws of philosophy and chemistry are when applied to other lines of work. But the farmer now realizes that he must learn the fundamental principles which govern his work; must learn to discriminate between the different kinds of food for his stock—whether milk, butter or fat producing—must know the elements necessary in the soil to produce certain crops, which of those elements are contained in the soil of his farm, and how to supply those that are lacking at least expense and labor. With a cultured mind and a brain trained to grasp the laws that govern his work the farmer will be as proud of his knowledge as his brother, the banker, is of being conversant with those laws that control the finances of our country, and will be ready to meet him on his own level without cringing or apology. When the farmer invests his calling with the dignity that properly belongs to it, he will lift it to its proper place—high among the other professions. In days that are past the farmer was wont to think of himself as an individual, a solitary soldier fighting his life battle alone in the world's great field, with no thought of asking aught of his government, not even of his State Legislators, who, after obtaining their election by means of his vote, instantly became his autocrats, holding his destiny in their mighty hands, and making him to understand that between him and them yawned a great gulf, which he must never attempt to cross, as they were much better qualified to judge of his needs than a poor son of the soil could possibly be. But the railroads, telegraphs, telephones, the multiplying printing presses and newspapers, all those modern inventions which are bringing the ends of the earth closer together, with the aid of now and then a

Moses, who has risen from the ranks, have changed the spirit of the farmer. He is beginning to realize that instead of standing humbly alone, he has but to grasp his brother's hand, and he in turn, another until he reaches across the continent, and can ask what he will.

In our own State in 1890, over 500,000, more than half the population, was outside of cities and boroughs. Then why should the farmer rob himself of his dignity, and his God given rights, and give his business, his present welfare, and the legislation that will educate and train his children for their life work, into the hands of lawyers, bankers and politicians? He is beginning to see the folly of this, and to realize that he holds the balance of power, and is trying to impress upon the minds of the above mentioned legislators that they are not fixed stars in the political firmament; and should they fail to do the will of those who placed them in their present position, will be retired to the darkness of private life as suddenly as a comet (that dazzles the observer for a time, and even creates fear and consternation), disappears and is seen no more. The farmer in time past merely waited for the crumbs to fall from the government table, and if none fell he was resigned, saying he really had no right to expect anything. Now in the days that are so full of events of grave import to him, he is beginning to expect large slices of the main loaf, which he is just beginning to realize is really of his moulding, and the distribution should be partly at his dictation, and this newly awakened power is being felt in all the legislative halls of our country.

When our senators and representatives ask of their farming constituents what are their wishes in regard to bills pending in Congress; and even our President sends for a committee representing the organized farmers of our land, and inquires of them what legislation they most desire, it is such a tribute to the intelligence and power of our agricultural classes as this old world has never before seen. And yet we occasionally hear a farmer say, when speaking of Free Rural Mail Delivery or some other improvement, that it is "Really too much for us to ask;" but these are growing fewer every day, as one by one they come to claim their birthright.

Let us in no way give this grand upward movement an impetus downward. Let us in no way make it possible for the next generation to entertain the same feeling in regard to agriculture that we are now rising above. Let us allow the young people to approach the time when they will choose their vocation without being prejudiced against this one—without having had drilled into their minds for years that to be nothing but a farmer or farmer's wife, is to have no position of dignity. Teach them that advancement in life should no longer be measured by the material gain, but by the development of the highest and noblest type of manhood and womanhood, and

the whole past experience of this nation has demonstrated that this can no where be better developed than on the farm. Teach them that when a lawyer or doctor is called to take charge of a case, a teacher gains a position, or a clerk or bookkeeper, there is always some one who is made sorrowful because of it, who stands aside and waits for the next opportunity, perhaps with dear ones suffering for the necessities of life.

Not so when a farmer makes a success; the more abundantly his crops multiply, the more bountifully his harvest yield, the more the hungry world rejoices, the easier it becomes for those who suffer to be satisfied. He crowds no one aside, nor causes a heart to ache, nor makes one of altering spirit more discouraged. His mission is to cheer and bless. Though the farmer may seem to lack good things that lie within the reach of other professions, many times the abundance of those would be gladly exchanged for the simplicity and quiet of a farm life, could they drop their heavy burdens of care, caused by the fierce competition of business, and the wearing uncertainty that surrounds them. You who think that farming confines you to a narrow and too limited portion of the world—remember that many who are free to roam where they will, would eagerly give all their freedom for the sweet home life that is yours, and such fair smiling faces as daily surround your board; and though you may never behold with the eye of flesh the renowned and beautiful spots of other lands, teach yourselves and your children to observe and to love the beauties of nature in all her changing seasons around your own home, and learn to say with your whole heart, these verses that speak of love of home:

"I own my little home here,
By the mountains hid;
The sky spreads down about it,
Like a star strewn coverlid.

"I am besomed deep in beauty;
Like the dew-drop and the rose;
Let me fade into the silence of
The fragrant night's repose.

"Let me live here in the valley,
In its deep seclusion curled;
And behold the mighty pageants
Of the wonders of the world.

"Restless are the feet that wander;
Restless are the hearts that roam;
Here God shows me all his glories;
Let me stay and rest at home."

RAISING POULTRY FOR PROFIT.

BY MISS ANNIE HOLTZ. *Blain, Pa.*

READ AT BLAIN INSTITUTE, PERRY CO., Feb. 2, 1901.

Poultry rightly managed takes little from the farm and yields a larger profit than any other stock. The capital which the beginner must have before he can expect to make the poultry business sufficiently remunerative, need not be invested at once. It is an advantage with poultry keeping that the beginner can make his capital; that is he can grow his capital if he will be patient. What is meant is, that if one commences with fifty hens he need not be compelled to buy more stock immediately, as he can prepare one year for the next. He may have 200 hens the second year and have all accommodations complete. The third year he may have a flock of 500 and then increase every year if he desires hence, as the beginning is with a few, the capital will be small, and as he adds to the number of his hens he at the same time enlarges his capital.

Now, that is a point in favor of the poultry business—this gradual enlargement of the capital—which makes it so attractive to many and which also makes the business possible to those who cannot derive as large profit in proportion to capital invested in any other pursuit. But the great difficulty is the fact that nearly all who turn their attention to poultry are unwilling to wait a few years. They are not inclined to build up a business, but endeavor to get into it the first year, with a profit from a little capital and no experience. The one who begins with few and increases his flock gains experience as he travels along the road of progress, and while increasing his capital, is adding to his experience and becoming more capable of accomplishing the objects sought; the eggs and poultry sold being the sources of income. The hens that molt early are the ones to keep for they will lay in winter, when eggs are most in demand. If the early chickens are to lay before cold weather sets in they should be well cared for; give them plenty of food, plenty of room and good air.

Sell off the old hens before they begin to molt. The majority of poultry keepers overcrowd their yards and houses. As a rule the smaller the flock the greater the average profit. It is also true that the greater the number in one flock, the more care must be given to that flock to secure satisfactory results.

Common Sense Feeding.

No one would think of feeding cows grain only without hay or corn fodder, and expect to keep healthy animals. It is just as much necessary to give hens something for "filling," and cut hay and clover fill a place of importance in maintaining health in hens. If given scratching material of hay, straw or leaves, or if the hens are allowed access to barn mows, they will get a supply of filling but very likely will get an article of little food value. Still another danger not only to profit but to health, is the depending upon corn for feed. Corn has its place and is needed as a heat producing food; but to use it altogether, to the exclusion of wheat and oats is to get unhealthy birds and few eggs.

Another mistake is the feeding of so-called egg foods or powders. There is nothing you can feed to produce eggs and preserve health better than a well balanced ration of sound materials. A little spice is a good thing. During cold weather add a few chopped red peppers to their feed. Fowls should be given a variety of grain and make them scratch for it, as this will give them exercise. Scald the drinking vessels often. Saturate nest boxes and coops with hot salted lime wash. Fumigate houses and kill diseases, germs and lice.

Poultry allowed to perch in trees and on fences during cold weather contract roup and inoculate the whole flock. Turkeys have the right of way in the Thanksgiving market, and special attention should be given to preparing them for the occasion. Let them run and feed liberally on corn and wheat. Market only such as are in prime condition; the rest will be ready for Christmas. Fat, heavy stock is always preferred and must be dry plucked for shipping. Poultry should be thoroughly dry and cold, but not frozen, the animal heat should be entirely out of the body.

A hen may be considered to consume one bushel of grain yearly, and lay ten dozen or fifteen pounds of eggs. This is equivalent to saying three and one-tenth pounds of corn will produce, when fed to a hen, five-sixths of a pound of eggs; but five-sixths of a pound of pork requires about five pounds of corn for its production. Taking into account the nutriment in each and the comparative prices of the two on an average, the pork is about three times as costly a food as eggs. Therefore, it will pay better to feed waste milk to fowls than to pigs, if not enough for both.

FRUIT GROWING FOR PROFIT.

BY S. A. GUTSHALF, *New Germantown.*

READ AT BLAIN INSTITUTE, PERRY CO., FEB. 1, 1901.

When God had finished the creation of the Heavens and the earth, he planted a garden, in which were all kinds of fruits. After the flood, Noah planted a vineyard. Christ tells us of the fruitful and unfruitful tree. From this we learn that fruit growing is as old as creation, and was from the beginning.

With most farmers fruit growing is sadly neglected, they give their personal attention to all other work, but the orchard must look out for itself.

Among fruits, I place the apple first in importance, the wide extent of country over which they can be grown, its general usefulness, long keeping qualities, place it first among fruits. To start an apple orchard, do not plant too many varieties. In an orchard of fifty trees I would plant five early, ten fall, balance medium and late winter varieties. Plant only such varieties as have been tried and are known to succeed in your locality.

SOIL.

Any deep, well drained soil will grow apples, if properly cared for. At planting, prune off all side branches and cut back in most cases to a stub, in this way you will start a new head, and you can grow the top of your tree any shape you may want it.

Fertilize your ground and cultivate thoroughly. On this depends the life and growth of your tree. One of the worst enemies of the apple is the borer. Dig around your trees at least twice each year, and hunt them out with a knife and crooked wire. Do not depend on washes to kill borers. A wash that will kill the borer will kill the tree. Prune so your tree has an open head and will not grow forks to split and destroy your tree. If you wish to train your tree low, this can be done by pruning. If you want them up out of reach of stock, and to work under, careful pruning will shape them into what you want.

The peach unlike the apple, can be raised on thin, dry soil, by using plenty of fertilizer. Have known thrifty peach trees grow where there was not over three inches of loose soil on top of solid slate rock. At planting, cut back to stubs and force growth of new wood. One-half of each year's growth should be cut back, thus insuring new wood. On this depends the next year's crop. The borer in the

peach, as with the apple, is one of the worst enemies. Examine your trees thoroughly at least twice each year, and destroy them. Do not plant too many varieties; and as with the apple, such as have been tried and succeed in your locality.

Pears and cherries will grow on almost any soil, and have fewer insect enemies than the apple and peach, but require more care in planting. Pruning is not so important as with the apple and peach, for the reason wherever you cut, suckers are likely to start and make a brush heap of the top of your tree.

Grapes can be grown on nearly all soils, provided you plant hardy varieties. Along the sides of our mountains and ridges wild grape vines grow where there appears to be nothing but stones and rocks. The grape, unlike the apple, peach, etc., cannot be grown without cultivation, fertilizing, pruning, and the use of common sense. All these are needed to make grape growing a success. Severe pruning is necessary in grape growing. Prune out all dead wood, and cut back to one, two or three buds. The grape always grows on wood of the same year, grown, as a rule, out of last year's wood; for this reason severe pruning is necessary to force growth of new wood, and to keep vine from over-bearing. If allowed to over-bear, grapes will not mature.

I could continue this list indefinitely, but the time allotted me is too short to more than touch upon a few of the varieties. Volumes have been written on the subject of "Fruit Growing" by abler pens than mine.

FRUIT GROWING FOR PROFIT.

Profit in fruit growing depends on attention to the smallest details. The merchant who gives attention to the smallest details of his business, will in most cases succeed. The manufacturer, if the price of his products is low, will make a profit out of his waste material. If the farmer as a fruit grower would give the same attention as the merchant or manufacturer, profit would be assured; but in most cases the tree is planted, cattle are allowed to destroy, or no care or attention is paid to it; if the tree comes into bearing, it is not cultivated, pruned or in any way cared for. The result will be small, knotty, almost worthless fruit.

If profit in fruit growing is to be secured, let it be given thorough cultivation, careful pruning, spray at the proper time, thoroughly examine your trees at least twice each year for borers.

When overloaded, thin out the fruit. The farmer will spend day after day thinning out corn, knowing that it will pay him well in the large ears he will get. Thinning fruit will bring as much profit, if done at the proper time.

Pick when fruit is fully matured. Do not pick two weeks earlier or later to suit some phase of the moon. Handle carefully as you

would eggs; bruised fruit is not profitable. Use a basket to pick in; not a grain bag slung over your shoulder. Keep in a cool, dry place, sort over from time to time, and there will be a "profit in fruit growing."

To sum up, buy good, thrifty trees, from a reliable nursery, or from an agent representing a reliable nursery. Plant carefully in soil adapted to kind of fruit you want to grow. If you do not understand the pruning of tops and roots at planting time, employ some one who has had experience to do the work for you. Cultivate thoroughly, for on this depends a strong healthy growth.

THE IDEAL FARMER.

BY FRANK T. GERNET, *Nazareth, Pa.*

READ AT MOORESTOWN INSTITUTE, NORTHAMPTON CO., JAN. 8, 1901.

The ideal farmer, whom we may also call the successful farmer, needs very little in the form of an introduction. If you pass a place where your eye is attracted by a beautiful house standing in the midst of a lovely lawn, wherein the grass is constantly kept short with a lawn mower, causing it to have a green, velvet appearance, with all kinds of shrubbery, flower beds and shade trees, under which is hanging a hammock; where winding walks lead from the gates up to the house, and on out to the barn, which together with all other out-buildings present the same air of tidyness; where the fences are all in good condition, no brush or weeds to be seen along the roadside; where the fields are laden with the heaviest crops attainable; where all animals from the horse down to the dog and cat are in good condition. If you pass such a place, it is the home of the Ideal Farmer, the one that all of us should endeavor to imitate.

There is a great difference between the ideal farmer and the farmer that is so often called nowadays a successful farmer. The former is always successful financially and his chief aim in life is to make his fields as fertile as a garden, his home as lovely as though it was to be his everlasting abode. The plan of the latter is to make money, to let his buildings and fences become dilapidated, his fields exhausted in fertility, his cattle suffer for want of proper food and treatment; and as soon as all his debts are paid and enough left to buy a house and lot, he rents his place and moves to town, where he will often wonder why his tenant is not able to make money as fast as he did. What a pity it is that we have so many so-called successful and so

few ideal farmers. What a vast difference in attractiveness the country would present, if we had none of the former. It would make our abode a "Garden of Eden," from whence our sons and daughters would hesitate to leave for a life in the city or town.

The ideal farmer's success may be attributed to (1) intelligence; (2) attention in detail to all the branches of his vocation; (3) business methods.

First, intelligence is the prime factor which produces in all callings of life. You will notice that the intelligent merchant, mechanic and even the laborer, possesses an advantage over their ignorant competitors. The farmer is no exception to this rule. It was the intelligent mind that has set the wheels of the great inventions of the nineteenth century into motion; that builds the ships that plow the ocean from continent to continent, with its thousands of tons of freight and passengers in five days; that gave us the fine passenger transportation and light our houses and streets by electricity; that discovered and solved the scientific problems which are of such vast importance to the agriculturist. Yes, in short, all progress the world has ever made must be attributed to intelligence. Daniel Webster said that it requires greater talent, more knowledge and better judgment to be a good farmer than to be a great statesman. The person that wants to be a ideal farmer is not slow in detecting this. He may not hold a diploma of a high school, much less of a college, yet his mental capacity must be improved, in order that he can comprehend the researches made by the scientists, and apply them to his profession.

You may ask, how can farmers improve mentally? I answer, that there is no class of citizens from the Atlantic to the Pacific, from Canada to the Gulf of Mexico, that has greater facilities, that is more favored through legislation toward this aim, than the farmer. For an example, let us take our own State. We have our college, where-with is connected the Experiment Station, the income of which is derived from the proceeds of the sale of the public lands donated to the State by the general government for college purposes. The State holds these proceeds in trust, for which it has given its bond for \$500,000, on which it pays interest to the college at the rate of 6 per cent., or \$30,000 per annum. Under the provisions of the act of Congress, approved August 30, 1890, the college got an additional sum of \$15,000 per year, to be increased \$1,000 annually until it amounted to \$25,000. So that at present the income is, through legislation, \$55,000 per year. To this college you can go or your sons and take a four years course in agriculture for the nominal expense of \$50 and board per year. Knowing that the farmer upon whom duty and responsibility already rested, could not avail himself of a four years course, our wise and thoughtful educators instituted a short course, consisting of twelve weeks, during the time when farm work

is not pressing, generally beginning the first week in January. This course is the most practical, because persons of any age over 15 years, without any previous preparation, can enter and receive thorough instruction through recitations and lectures upon all farm topics. To make it still handier and less expensive, the college and Experiment Station is coming to us in the form of the Chautauqua or Correspondence Course, and the Farmers' Institute. Here we have to-day in our midst practical educators and scientists sent here at the expense of the State, to solve and explain the perplexing questions that confront us every day in the year. Now show me if you can another class of citizens with an equal legislative favoritism for mental improvement.

Yet how few avail themselves of the simplest, inexpensive of all chances, viz: The Farmers' Institute. To-day many are absent who badly need the information by the State speakers, should they desire to become ideal farmers.

Another means of self culture is to own a farm library, obtain all bulletins issued by the Experiment Station, subscribe for a number of agricultural and stock papers, read and study all of these, comparing the methods used by successful farmers, formulating therefrom a system that is applicable to the locality and circumstances of the individual. An article entitled "Don't's on the Farm," by Prof. Geo. C. Butz, in a November issue of the *American Agriculturist*, is not simply worth a years subscription, but hundreds of dollars annually to any farmer that will put his advice into practice. I recently heard a woman make the remark that she who would take the *Farm Journal* and follow its instructions, would have a tidy home, everything done at the proper time, and raise the best crops of everything; in short, would be an ideal farmer.

It is not that we only need the intelligent farmer at home to make it attractive and raise big crops, but we need him in the State Legislature and National Congress in order that our vocation may not suffer through the tricks and treacherous schemes of the trusts and monopolists, who are continually trying to fleece us.

Second, the ideal farmer succeeds because he pays strict attention in detail to all branches of his vocation. His dairy is making big returns for the capital invested; his cows never stand in the yard during all kinds of winter storms long before the sun is up and till after it has set, drinking ice water, and their digestive organs burning up grain to give them heat, that should go towards the making of milk and butter. His scientific knowledge has compounded a ration that will produce, at a minimum cost, the greatest results in the pail, and at the same time return the most fertility through the manure to his fields. He has also continually employed two dairy detectives, the scale and Babcock tester. These two through their vigilance inform

him whenever a robber cow gets into his herd, and no sooner discovered he will sentence her to the mercy of the butcher. The manure after it has been enriched through his forethought in feeding will not be allowed to lose the most valuable ingredient, nitrogen, but he has a trap, land plaster, that will catch and retain it; neither will he allow the rains to leach the potash and phosphoric acid, for he has either got his yard covered or hauls the manure directly to the fields. All the other live stock departments will receive the same careful attention. Every crop that is planted will not suffer for want of fertilization, cultivation, harvesting and marketing them at the proper time.

Third, business methods. Would you think that any merchant or manufacturer could succeed without knowing whether he was gaining or losing on the sales he is making?

The merchant finding that an article is costing him as much as his competitor is selling it at, he will immediately make an attempt to buy it for less money in order that it would leave him a profit, and should he fail to do this he will not handle it at all. The manufacturer if he finds that another firm is underselling him, and he is unable to meet their prices and still leave him a profit, knows that the cost of producing that article is too high, and he sets his brain to work to find a method whereby the production can be cheapened.

Every business man at the end of the year makes an inventory of his goods to ascertain if he gained or lost, and how much. The ideal farmer like his business friends knows what every pound of butter or gallon of milk is costing him; what every bushel of potatoes and all kinds of grain, every pound of live stock, every ton of hay, and all other productions on his farm, he knows just what the cost thereof is. And if he finds that the cost overbalances the receipts he will endeavor to lessen it, and if unable to do so, he will drop it altogether, and produce more of that which will pay a profit. His inventory will show him too, at the end of the year, in bold figures what he made or lost that year.

How many of us must acknowledge that we farm year in and out without ever knowing the cost of a single crop, a gallon of milk, a pound of butter or live stock, and we wonder why we don't make money.

Now let us all at the beginning of this 20th century firmly resolve to get out of the old ruts and become more intelligent, pay strict attention in detail to all branches of our vocation. Use business methods, and when the great reaper, Death, has mown us down, that those are left behind may say, "he was an ideal farmer."

POULTRY.

BY F. W. TOWER. *Beaver Center, Pa.*

READ AT DICKSONBURG INSTITUTE, CRAWFORD CO., JAN. 12, 1901.

The value of poultry on the farm depends wholly to proper care and attention to the numerous little details that present themselves daily. Poultry pays best of all side branches to the farm if we bestow upon it the care that it justly deserves. Like any other branch of agriculture, we must not expect to reap unless we sow.

The farmer who provides warm and pleasant poultry houses, and thus changes as near as possible winter into summer, judiciously selects food, and maintains the proper heat and health of the egg-machines, will surely reap his reward in a well filled egg-basket. But do not flatter yourself that plenty of corn with a few shells for desert, will prove satisfactory to you when you look over your egg record.

When winter eggs are desired, try the following menu for your poultry: Cooked vegetables seasoned with a little salt and pepper and a little oil meal for breakfast, and slightly warmed water or skimmed milk for drink. Do not feed so much that the fowls will gorge themselves and be lazy and mopish; just sufficient to prepare them for the second course, which is wheat and oats and buckwheat scattered in a chaff litter; this necessitates them to work for what they get. Keep bone and shells constantly in the troughs; also dust for wallowings, and note how they enjoy the dust bath. For the evening, feed, if the weather be cold, corn, not shelled, but the ears broken, or chopped into sections with a hatchet. If the weather be mild, would prefer part oats, wheat or buckwheat. Meat in some form, dessicated if not obtainable otherwise, two or three times a week must be provided. Cabbage and other green food must be given occasionally.

Now to make a long story short, furnish good quarters, place proper egg material where the egg machine gets it and it is impossible for it not to shell out the eggs. There are many poultry keepers who give the warm, worked food for the evening meal, and I am not prepared to dispute the advisability of that plan of feeding.

As to the proper breed for year around egg producers, I consider the Buff Leghorn the best. But each one has a favorite, and justly so, for each breed has its individual merit. It costs no more to feed

and care for the thoroughbred or fancy poultry when once you have the stock, than for the mongrel, and, financially, they lead; for with a little "ad" in even your county paper you can sell a goodly number for breeders and exhibitions; also eggs for hatching. But be sure you have what you advertise, a No. 1 stock.

The satisfaction of having fine thoroughbred stock is no small item with me. Remember the best fancy stock to be found in the United States is grown by farmers. In other words, farm grown stock, other conditions being equal, is considered best. Of course in procuring a start in thoroughbred fowls, long prices are often asked and you must use judgment in buying, but buy of a good reliable breeder, and be willing to pay a fair price for good birds.

The poultry business is no small industry in the United States; it is one of the greatest. The present annual value of the poultry product will not vary far from \$500,000,000. Our American poultry earns enough each year to buy all the gold and silver taken yearly in our mines, all the sheep and wool, and yet have enough reserved to pay the interest on our mortgaged indebtedness. There is little doubt if all poultry were properly housed and fed to produce to the full capacity, the egg production would be nearly double the present output.

And now a few thoughts for your note-book, and we will leave the subject for your present and future consideration.

Introduce new blood among the poultry.

In stormy weather hens should be kept indoors.

Do not let the hens run in the snow.

Give the fowls especial care during the moulting season.

Oil meal will assist and hasten the moulting process.

Do not expect to get good thoroughbred poultry for six cents per pound.

Keep the hen-house clean and sweet.

Hens should have food and drink at regular intervals.

Treat your fowls gently and they will be tame and look to you for kindness.

Save all the droppings for future use.

Give your fowls plenty of room; save crowding.

Keep the roosts saturated with kerosene.

Keep the hen-house free from lice, and the hens also.

Feed salt very sparingly; large amounts often prove fatal to them.

Save your second crop clover; cut it up and feed with an admixture of bran.

Do not forget a supply of fresh water; an egg is nine-tenths water.

POULTRY RAISING.

BY JOHN J. PATTERSON, JR., *Mifflintown, Pa.*

READ AT McALISTERVILLE INSTITUTE, JUNIATA CO., JAN. 20, 1901.

I have been invited to address you upon a subject that is fast gaining eminence among our other business enterprises. The old hen and her brood in years gone by, would not have attracted capital to the extent that she does to-day. I could name you poultry plants, that are in operation at the present time, which have cost from \$1,000 to \$50,000. Gentlemen, the poultry business is in its infancy. One has only to stop and think of our enormous population, and with our new possessions, to find the cause of this new interest in the hen. We have over 70,000,000 of people to feed and they must be fed every day in the year. I have seen it stated that a certain man in New York City made a trip, at the noon hour down Broadway, where there was a very large force of men at work, and he found 95 per cent. of the dinner buckets contained from two to six eggs. The egg is to the poor man what the porter-house or sirloin steak is to the rich.

In order to show you what a small thing (as some call it) our poultry industry is, I will quote you some figures taken from the United States Statistics for the year 1897. There were in this country, about 375,000,000 chickens, and 40,000,000 other fowls, such as ducks, geese and turkeys. During that year 14,400,000,000 hen eggs were laid. The export price at New York averaged fifteen cents per dozen, which makes the value of the egg crop \$165,000,000. Poultry sold as meat, as broilers, boilers and bakers, brought \$125,000,000 more, making the total hen crop, at a very conservative estimate, \$290,000,000 or the annual consumption of a little over \$4.00 worth of poultry and eggs for every man, woman and child in the United States. Now you will readily see what a business "biddy" has done and it is rapidly increasing.

In order to give you a more comprehensive understanding of the poultry industry, I will quote you some figures for the year 1897:

Earnings of poultry,	\$290,000,000 00
Total of pensions,	139,280,078 15
Total of school expenditures,	178,215,556 00
Total interest on mortgages,	76,128,077 00
Value of swine,	186,529,745 00
Value of potato crop,	78,981,001 00
Value of tobacco crop,	35,574,220 00
Value of cotton crop,	259,161,640 00
Value of oat crop,	163,655,068 00
Value of wheat crop,	237,938,998 00
Salaries of all school teachers,	116,377,778 00
Value of all church property,	679,630,139 00
Total military expenses,	52,947,075 00
Value of all minerals,	218,168,788 00
Value of gold,	46,610,000 00
Value of silver,	72,510,000 00
Value of wool,	38,146,559 00
Value of sheep,	68,167,725 00
Value of milch cows,	263,955,545 00

Now, you will see that there is only one industry or property, that exceeds the value of the poultry industry, and that is our church valuation, which is more than 679,000,000; and there is only four industries that exceeds 200,000,000, the cotton crop, all minerals, wheat crop and the value of the milch cows. I give you these figures so as to impress upon you the magnitude of the business. It is one of the industries that nearly every one contributes to.

To get down to my subject, let us ask ourselves, "How can we make poultry profitable?" Can we make any business profitable by keeping inferior stock or goods, and not give it our most careful consideration and attention. In the first place, prepare yourself to properly house your poultry when they need your assistance to keep them comfortable. Allow me to give you a little advice, although being younger than some of you in years, I feel confident I can aid you in this matter. It has been proven beyond a peradventure of a doubt, that where poultry is kept in flocks of more than twenty-five head, they are not profitable. As to the size of the house, the building should not be less than 50x14 feet, for a flock of fifty and seventy five at the most, and the flock should be divided into two or three flocks of twenty-five each. Your house should be well built, not costly or extravagant, but substantial. It can be built for \$75 complete. Perfectly dry, and allow me to impress this upon you, and thereby save yourself trouble in the future, when you least expect it. In winter time have it well lighted and ven-

tilated. Do not place your ventilators so that any draught will strike your flock.

Next as to the breed. That depends upon what purpose you intend to keep your poultry for. If you want an egg producing strain alone, and care nothing about the size or weight, then the small breeds, such as the Leghorn, Minorcas or Hamburgs will answer your purpose; but if you want eggs and flesh combined, then raise any of the larger breeds, such as the Plymouth Rocks, Wyandottes or Games. Some will say, "What about the Brahmas or Langshans, I answer, leave them alone. For as the boy says, "They are not in it." You must raise a breed that will furnish you a goodly number of eggs, and when they are two years old, can be disposed of to an advantage. Then again you want a fowl that is in demand, and I want to impress this on you. The fowl that is in demand is the clean, yellow leg and flesh one. A man not posted in these matters, decides to ship a box of live or dressed poultry to the market. He has yellow legs, white legs, black legs and feathered legs, in his consignment. He sends them and gets his returns, which we will say, for illustration, is nine cents per pound, and he looks up the quotations and finds that the market is paying nine to eleven cents per pound. His neighbor who has given the matter more attention, has selected a yellow leg and skin breed. He ships at the same time and his returns are eleven and may be twelve cents per pound. He tells our friend about it and the question arises in our friend's mind, "Why didn't I get eleven or twelve cents instead of nine cents per pound." I will tell you why he didn't. You farmers all know that if you ship a barrel of apples, half of them good and the balance specked or rotten, you don't get the top price, but if you ship a barrel of selected fruit, your returns will be the highest quotation, providing the market is not overstocked. You must raise something that everybody does not raise, and there is no danger of overstocking the market with first class goods. First class goods are always in demand; the same in the poultry business as any other business.

How am I to raise my poultry, is the next question. Having provided yourself with the proper buildings and selected your own breed, the above question presents itself. Purchase one or two incubators, you might in order to get the experience purchase a fifty egg capacity machine for \$5.00, but you can learn just as well, if not better, with a 200 egg machine. What you want to do, is to hatch the number you intend hatching, all about the same time and as fast as you can do it. Chickens must be produced and handled in fair size quantities, the same as eggs to be profitable. In order to show you what can be done, we will take for an illustration, that we have a source to produce 200 eggs a week, then purchase three incubators of the 200 egg capacity. Now you can set 800 eggs every

four weeks and should be able to hatch five to 600 chickens per month. If you continue three months you ought to have at least 1,500 chicks to take care of. Then the question arises, "How am I to raise them." You can purchase what are called brooders and with an outlay of \$50 to \$75 you can erect a brooder plant, not including the cost of the building, which can be governed by your own means.

As to the make or style of incubator, all I can say is that the market is full of them. All kinds and makes. We have what are called the hot-air system and the hot-water system. Speaking from experience I would advise the use of the hot-air system, because where you have water to contend with you are always liable to have a leak in your water tank. A man cannot expect to get large returns from his poultry unless he prepares himself to raise and keep them on a fairly large plan. If you have your poultry hatched then look for a market and you will find that the dressed poultry in the fall of the year commands you the best prices, providing you have first class stock. Your dressed poultry is all shipped dry picked and in barrels or boxes. Of course you can ship alive if you care to, but where a man has a family of young ladies and men, there is no reason why he can't dress his own stock and gain what the other fellow does who buys them alive. If your stock has been hatched from February to May, you will have pullets that will make you money when eggs are selling at an advanced price. Your male stock can all be disposed of at the best season of the year, namely, September and October, and you will find, if this plan is carried out, that your poultry will make you a better return for the capital invested than any industry on your farm.

Two things to be remembered. First—Raise a breed that is in demand, and that every one does not raise. Secondly—Have your pullets hatched so that they will be producing eggs when the majority of the hens are standing around trying to keep from freezing to death, and thinking to themselves, how they will lay the eggs after Jack Frost has disappeared. Your feeding must be such that will produce the eggs. Give them plenty of green food, both vegetable and animal matter, oyster shells, sand and grit, plenty of good grain and fresh water and they will surprise you with their egg production.

I must close, but before I do, I want to say a few words to you as to the enemy of our fowls—King Disease. Keep your poultry houses clean and fresh, well lined and disinfected with any good germicide; be not afraid of getting them too clean. Be sure there are no cracks or dampness. Watch your flock and if you notice one that does not want to eat, catch her and examine her and see if you can discover the trouble. Often times it is lice and not disease that is wrong. If you can't ascertain her trouble keep her by herself for a week and wait for future developments, and if you finally give the

question up as to her trouble, you had better kill her and bury the body, than to allow her to remain in the flock. Better kill one sick fowl than to lose a dozen. I could talk to you for some time upon diseases, but will not encroach upon your good nature any longer, so thanking you for your kind and considerate attention, I shall close.

MAINTENANCE OF SOIL FERTILITY THE BASE OF SUCCESSFUL FARM OPERATIONS.

BY J. T. CAMPBELL, *Hartstown, Pa.*

READ AT DICKSONBURG INSTITUTE, CRAWFORD CO., JAN. 11, 1901.

Soil fertility, the base of successful farm operations, is to every thoughtful farmer an axiom. Let us not then stop to consider the why but proceed to the more important phase of the subject.

You ask what constitutes a fertile soil? This question is by no means an easy one to answer. If we say a soil is fertile when it contains a plentiful supply of the constituents which form the plant food our answer will be incomplete. Indeed chemical analysis shows that many unproductive soils contain large quantities of plant food. The fertility of a soil must, therefore, evidently depend, both on its physical condition and on its chemical composition. Soil fertility in all its bearings is still very imperfectly understood even by the most learned experimenters. Climate, latitude, altitude and exposure all exert an influence on the fertility of the soil. These we shall not stop to consider.

The fertility of the soil may be said to depend upon the primary conditions, namely: The physical, the chemical, the biological. From the days of Jethro Till the physical properties of a soil have been regarded as having an important bearing on its fertility. Every one has observed that soils differ widely in their mechanical nature. One of the most important physical properties of a soil is its power of absorbing water. The water absorbing power of a soil depends upon two things, first, the predominance of its approximate constituents, namely, sand, clay, humus, etc.; second, on the fineness of the soil particles.

First, then, with regard to the absorptive power of sand, clay, and humus. Of these, sand possesses this power to the least extent, clay to a greater extent and humus most of all. Therefore we conclude that the more sandy a soil is the less will be its power of absorbing water. This is the principal reason why a very sandy soil is generally an unproductive one.

Secondly, the finer the soil particles are to a certain extent, the greater will be their power of absorbing water. There is a limit to which the soil particles ought to be reduced, as it has been found by experiment that when a certain degree of fineness is reached, the absorptive power decreases without any further pulverization. It is, however, improbable that the average farmer will ordinarily ever reduce his soil to so fine tilth. The trouble generally lies in the opposite direction.

Closely connected with the absorptive power of soils is the power they have of retaining the water they absorb. This power, it is readily seen, has an important bearing upon the fertility of the soil. As a considerable interval often occurs between periods of rainfall, soils that are to support a luxuriant plant-growth must be able to store up their water supply against periods of drouth. While the fineness of the soil particles has an important influence upon the absorptive power, so it has been found to have an important bearing upon the rate at which evaporation takes place. Evaporation is greatest when the soil particles are compact together. The stirring of the surface soil has for this reason an important influence in lessening the amount of evaporation. As a general rule, the greater the absorptive power the greater is its retentive power; for soils that most largely absorb water are most reluctant to part with it. While these properties are necessary for a fertile soil, they may in some cases be possessed by soils to too great an extent, hence the necessity for the drainage. The soil that is unable to throw off an excess of water is damp and cold and does not admit of proper tillage. The pores are choked up and the proper circulation of air is rendered impossible. A stiff, clay soil often offers a familiar example of over-retentiveness. Experiments have shown that plants have not the means of exhausting the water from a retentive soil to such an extent as in a non-retentive soil. The presence or absence of the above properties suggests a word or two in regard to how these defects may be to a certain extent remedied artificially. If the absorptive power of a soil is rendered greater by the presence of organic matter it stands to reason that if the organic matter be increased the absorptive power of that soil will also be increased, of which we will have more to say later. Where a soil is too retentive till drainage probably presents the best means of remedying such defect. Of this subject we cannot here speak at length.

During periods of drouth the hygroscopic power of soils is an important feature. By hygroscopic power is meant the power soils have of absorbing moisture from the air. The moisture which exists in the air in the form of vapor, is to a greater or less extent absorbed by the soil as air comes in contact with the ground during soil

breathing. However, at present, our knowledge of this subject is very limited. A property which depends largely on those we have just been considering is the capacity soils have for absorbing and retaining heat. The temperature of the soil will, of course, largely depend upon the temperature of the air, but this depends on the soil itself. The dark or heat rays strike the soil, a portion is absorbed—which will vary according to the nature of the soil—and the remainder is radiated into the air. The temperature of the soil is also due to other sources. When vegetable matter decays in the soil there is always more or less heat generated. Soils which contain a larger amount of vegetable matter are, therefore, warmer than purely mineral ones.

The color of a soil has also a striking influence on its temperature. Dark colored soils have a much greater heat absorbing capacity than those of light color. All are familiar with the fact that a black garment is much warmer in bright sunshine than a white one. This is because the black surface absorbs the ether waves as they come from the sun to a much greater extent than the white.

The power soils have of absorbing gases is an important one in connection with soil fertility. The air is largely composed of oxygen and nitrogen. These gases are both absorbed by soils in varying proportions. It is well known that a plentiful supply of oxygen in the soil is a necessary condition of fertility, as it has long ago been fully proved that plants absorb oxygen through their roots. Seeds in process of germination require free access to a generous supply of oxygen. This fact emphasizes the enormous importance of providing a good seed bed and not covering the seed too deeply. The soil also receives large amounts of carbonic acid from the air. This is largely washed down in solution with the rain. The various forms of nitrogen as ammonia, nitric and nitrous acid are also absorbed from the air to a considerable extent. Soils containing large amounts of organic matter absorb these gases to a much greater extent than purely mineral ones. This power soils have of absorbing gases depends largely upon the chemical as well as the physical properties. We shall have occasion to again refer to the absorption of nitrogen when we come to consider the biological properties of soils.

To recapitulate, the chief physical properties of a soil are, its absorptive and retentive power for water; its capacity for heat and its power of absorbing gases. It will be readily seen how all these physical properties may be influenced by tillage. It would be interesting to refer to the important influence these properties have on plant growth but time will not permit. As Samantha would say, "we must resume and continue on."

CHEMICAL COMPOSITION OF SOILS.

Chemically considered the soil is a body of great complexity. Plants contain fourteen elementary substances which are necessary to their growth: Carbon, hydrogen, nitrogen, oxygen, phosphorus, sulphur, chlorine, silicon, calcium, iron, magnesium, manganese, potassium and sodium; of these, all except carbon are derived almost exclusively from the soil. Of these, only nitrogen phosphorus and potassium are likely to be deficient in the soil. The importance of seeing that all the necessary plant ingredients are present in the soil in proper quantities will at once be properly estimated when it is stated that the absence or insufficiency of any one of these three elements is capable of preventing the growth of the plant even though the other two may be present in abundance. But in considering the chemical properties of soils, a simple consideration of the different ingredients is not enough, we must also consider their chemical condition. Before any plant food can be assimilated by the roots of plants it must first be rendered soluble. The quantity of soluble or available plant food in the soil is very small, but is being constantly added to at least during the growing season. From one point of view chemical analysis is of little value in giving evidence of actual fertility. While the potential fertility may be readily ascertained by chemical analysis, the available fertility cannot be ascertained in this manner.

A point of considerable interest is the quantity per acre different soils contain of nitrogen, phosphoric acid and potash. When these ingredients are calculated in pounds per acre, they are found to be in large excess of the amounts likely ever to be removed by crops.

BACTERIA OF THE SOIL.

The soil of every cultivated field is teeming with bacteria whose function it is to aid in supplying plants with their necessary food. The presence of these organisms is indispensable to the fertility of the soil. The nature of, and the function performed by these organisms differ very widely. One very important class prepare the food of plants by decomposing the organic matter in the soil into substances readily assimilated by the plant. Plant life is unable to live upon the complex compounds of the organic matter in the soil and if it were not for these organisms these substances would remain unavailable. There are organisms in the soil which have the power of reversing the work of nitrification, so that the action of bacteria is not wholly beneficial. From what is at present known of these organisms they may be divided into three classes. First, those whose function it is to oxidize the soil ingredients; every soil is probably teeming with this class. The second class are those that

destroy the soil constituents. The most important of this class are those which effect the liberation of nitrogen from its compounds. It is through the agency of this class that the soil is made to lose some of its nitrogen in the "free form." To this class also belong the denitrifying organisms. The third class are those by which the soil is enriched. The organisms by which leguminous plants obtain nitrogen from the air are of this order.

Having now very briefly considered the soil and its fertility from a scientific standpoint, we will review the various ways in which the fertility of the soil may be maintained.

Not only is it necessary to maintain the fertility but is also often necessary to increase the fertility of the soil so we can have a base for successful farm operation. How to maintain and increase the fertility of our soils is, therefore, a question of vital importance to every thoughtful farmer. There are two practical ways of maintaining fertility; first, by the use of manures; second, by tillage manures. These may be divided into three great classes, namely, direct, indirect and compound. By direct manures is meant, those that supply to the soil necessary plant food and thus contribute directly to fertility such as guano, dried blood, chemicals, bones, tankage, etc. Manures which may be regarded as having an indirect value, are lime, gypsum, salt, etc. Compound manures are those that have both a direct and an indirect action as barn manure, green manure, compost, etc.

Let us for a moment consider direct manures as a means of maintaining soil fertility. The great value of this class of manures is every year becoming more apparent. This class of manures includes commercial fertilizers which we are pleased to consider under the head of chemicals. There are many farmers who still believe that the fertility of the soil cannot be maintained by the use of chemicals. Yet there is abundant proof that by this means soil fertility may not only be maintained but greatly increased. At the great Rothamsted Experiment Station, the fertility of the soil has been maintained during more than forty years of continuous cropping without rotation by the use of chemicals alone.

But it is needless to look to England for examples of this kind. Seventeen years ago Geo. A. Clarke, of Connecticut, took a piece of barren New England land producing less than 200 barrels of vegetation per acre and by the judicious use of chemicals alone is now enabled to remove from this same land from five to eight tons per acre of well cured hay annually. This has been done at a profit. No doubt much of the prejudice against chemical manures has arisen from their injudicious use. Millions of dollars have in the past been lost in this way. If we would use chemicals advantageously we must find out what elements are lacking in the soil and supply those elements. The modern idea of manuring the crop and not

the soil should be carefully kept in mind when we purchase chemical manures. Of indirect manures, we shall consider only lime and gypsum. The action of these is not well understood. They act indirectly rendering available to a certain extent the phosphoric acid and potash of the soil. Lime is most effective in reducing to assimilable form the inert organic nitrogenous matter of the soil. The growth of sorrel is a good indication that the soil is in need of lime. The compound class includes barn manure which is undoubtedly the oldest and still the most popular of all manures. It has stood the test of long experience and is the most important of all our fertilizers. By the careful saving and application of the manures produced on the farm the fertility of the soil may be largely maintained. Especially is this the case if all the forage and grain crops are fed upon the farm. But it is apparent that there are many farmers who fail to appreciate the value of barn manure. We see the manure carelessly thrown under the eaves of the barn; the soluble fertility in a dark stream running from it, perhaps down across the road and into the brook, thus contaminating the water that animals must drink. Manure is never of more value than when first made. Therefore as a general thing the sooner it is returned to the land the less will be the loss. For the average farmer there can be no better method than to haul and apply the manure as made. Green manures may be made to occupy an important place in the maintenance of fertility. The most important class of plants for this purpose are the legumes notably the clovers, cow peas, etc. We have already referred to the means by which this class of plants obtain nitrogen from the air. The value of clover as a manurial plant is pretty generally appreciated, though not every one is aware that a luxuriant growth of cow peas may be secured right here in this vicinity. At Woodbine Farm we grew one and one-half acres last year and secured very satisfactory results though the peas were not planted until June 15. The manurial value of the corn pea is fully equal to that of clover. They grow very quickly and will thrive on land too poor to produce clover. We can only here speak briefly of these things, but would be pleased to answer any question you may ask concerning them.

As a general rule for maintaining fertility we would place our dependence chiefly upon barn manure and leguminous crops using commercial manures as a supplement. We have already referred to tillage as a means of maintaining fertility. The primary meaning of the word manure is "to till." It comes from the French word *manœuvrer*, to move with the hands, to stir, to till. As a method of tillage we cannot speak of these at this time. Thanking you for your kind attention, we commend the subject to your careful consideration.

EFFORT, ESSENTIAL TO SUCCESS.

BY FLOYD W. BEEK, *Nazareth, Pa.*

READ AT HECKTOWN INSTITUTE, NORTHAMPTON CO., JAN. 5, 1901.

All creation is the result of effort made somewhere, sometime, by somebody. Long ago, thousands of years before the Christ-child lay cradled in a manger, this world which we call ours was created by effort—effort divine. After its creation, God ordained that from thenceforth to the end of time it should be run by human effort. And how the latter succeeds in running it—sometimes in a gallop—and then again it will be centuries passing a given point.

My friends, open wide the annals of the world's history, and on its pages, made sacred by the noblest deeds and holiest sacrifices of ages, you will ever find that where the most was accomplished, the greatest victories gained and highest honors won, there was put forth some grand, some sublime effort. In our struggle for wealth and fame we must never forget that all true greatness, I care not where-ever it be, is gained only by mighty effort and persevering toil. "Ah," you say, "some men have greatness thrust upon them." Thus it seems, and sometimes may be so; but unless they back it up with strenuous effort and honest toil it will be a curse rather than a blessing to them.

"The heights of great men reached and kept,
Were not attained by sudden light;
But they, while their companions slept,
Were toiling upward in the night."

Some of you may think that President McKinley who has the honor of being twice elected to the highest office in the gift of the American people had some of his greatness thrust upon him. Some of you may even feel as if you had a hand in thrusting it there. Well, now, you are badly mistaken. Our President, like all other great men, achieved his greatness.

Regardless of all the men of eminence whom the past century has produced in this dear "land of the free and the home of the brave," perhaps the grandest figure, the noblest example of mighty effort and unceasing perseverance is Abraham Lincoln. I have often contemplated his life. Have you ever heard of a boy or girl starting out in life surrounded by less auspicious circumstances? Born in a

Kentucky log cabin, of parents who could hardly read or write, his own education consisting of one year's schooling, reading no other book than the Bible—the book of great sorrows and great hopes—compelled to live out as a hand on a flat boat, and later, with axe and arm felling the immemorial trees for rails to inclose his father's farm, the future President was indeed a child of nature. But, like a newborn Moses in the solitude of the wilderness, he overcame all these obstacles. How, say you? By luck? No sir, never! No luck there! It was all strenuous effort and honest, unremitting toil—such as always tell. As a Spanish author says, "his work stands as a sublime achievement over which humanity shall eternally shed its tears and God his benediction!"

Thus I might continue to enumerate the names of great men and great women in every calling of life, throughout every age, who in their youth possessed no greater advantages than you or I, the only difference being their superior will power and ceaseless efforts which made them famous.

For brevity's sake, suffice it to say, that what is true among great men and great women is equally true among the common people. To meet with success the merchant must employ as much effort as the statesman; the blacksmith as much as the warrior; the farmer as much as the author.

"All are architects of fate,
Working in these walls of time;
Some with massive deeds and great,
Some with ornaments of rhyme.
"Nothing useless is, or low;
Each thing in its place is best;
And what seems but idle show,
Strengthens and supports the rest."

Fellow Farmers: In the days of financial distress, among many of your class, it becomes particularly imperative that you should employ every honest effort to successfully meet life's battle.

"In the world's broad field of battle,
In the bivouac of Life;
Be not like dumb, driven cattle!
Be a hero in the strife!"

In the present age we need more heroes on the farm. More men of Lincoln's type. While we hear of heroes on the field of battle, and love and cherish their memories with fond devotion, and see to it that the name of each returning hero is hung out to shine in the bright galaxy of national glory, yet, and even help to rear monuments to proclaim the immortality of their noble deeds, we so seldom long for a share of the glory that comes to the hero. "Ah," you tell

me, "we cannot all be heroes." My reply is: Every man and every woman who has the courage to make an effort can be a hero. By vigorous effort, intense application and invincible perseverance you can be a hero in your profession—a hero on the farm. Some one has rightly said: "No man brings into the world any other nobility than that with which the God of Nature has endowed him—sovereignty of mind—the sceptre of genius; and in this freest, broadest field of action he must become the architect of his own fortune, the master-builder of his own destiny."

Some of you may say the farmer can't make a fortune. Others who have perhaps never made much of an intelligent practical effort will tell us things so bad that the farmer can't make a living on the farm.

The Democrats tell us now that if McKinley is re-elected the times will become so bad—the farmers will be so much oppressed—that it will be utterly impossible for them any longer to stay on the farm; and some perhaps may start working in our cement mills where they have harder work, less liberty and no more money.

Our Republican friends give their side of the story. They tell us since Grover Cleveland happened to be President four or five years ago, he made the times so bad that it now requires a lifetime of Republican administration to remedy the evil; if indeed it can ever be remedied. Meanwhile our Republican friends leave the farm. Thus the followers of both political parties leave the farm for some other occupation, while they let their legislators legislate for them.

Would it not be wise for the farmer to stay on the farm and do a little legislating for himself? We admit that the farmer's times are not as brisk as they might be; we admit that their rights are overlooked; that corporations and trusts are sucking their life blood; but the proper way for the farmer to begin business is to make a strenuous effort to remedy these evils, and do it too—as the Bryanites would put it—do it without the aid or consent of any other nation on earth—do it himself. The time has passed when the farmer can expect aid from a few sleek politicians, whether Democratic or Republican. Like all other professional men, he must learn to help himself. I seem to hear you say: "How can all this be done? How can we help ourselves, poor oppressed mortals? How can we make the farm pay?" I venture the reply. By persevering, intelligent effort, farming can still be made to pay. "Oh, nonsense!" you say; "we can't make farming pay, and we have tried our best." It may be true that you have tried your best at that which you have tried and failed; but if one failure has dismayed you, you are yet far from a hero in your profession. Why not try something else, and not leave the farm to do it, either? If you can't make money on chickens is that a proof that you can't make money on turkeys? If you can't make money on horses is that a proof that you can't make money on

cows? If you can't make money on cider, is that a proof that you can't make money on milk? If you can't make money on wheat, is that a proof that you can't make money on potatoes? With nigh a hundred opportunities that present themselves to the wide-awake, energetic farmer, would you leave the farm and tell the world you could not make a living?

My friends, these institutes are designed to benefit the farmer in an education way. They are to assist him in his profession. They are to teach him new ideas, new methods. They are to direct him to the road of success. May they succeed in their mission! But unless the farmer, after leaving these halls, will practice new and better methods, and makes an effort to improve his old and often unsuccessful way of farming, they will prove a signal failure.

Among the proverbs of Solomon we read: "Where no counsel is, the people fall; but in the multitude of counsellors, there is safety." Therefore follow the counsel of these men to whom you have had the pleasure of listening to-day; who know their business and do it.

A good many of you may know that raising wheat alone does not pay, but you fail to make an effort to change your grandfathers' methods. There half of all your worldly troubles lie. Effort, my friends, is one of the pillars in the temple of success. Make an intelligent effort, and you will be surprised at the prosperity that will be yours.

"Are riches worth the getting?
They must be bravely sought;
With wishing and with fretting,
The boon cannot be bought.

"To all the prize is open;
But only he can take it
Who says, with Roman courage,
'I'll find a way or make it.'"

NATURE STUDY FOR COUNTRY SCHOOLS; HOW INTRODUCED.

BY A. D. WANNAMAKER, *Portland, Pa.*

READ AT MT. BETHEL INSTITUTE, NORTHAMPTON CO., JAN. 9, 1901.

For many years a controversy has been going on in our higher institutions of learning between the advocates of the classics and sciences. One class has limited education almost entirely to the study of man and his languages, history and literature, and to

methods of exact reasoning, or mathematics. The other has advocated the study of man's surroundings, his physical environment, of the world in which man is placed and on which he so largely depends. The defenders of the classical education have been compelled to yield point after point to the champions of scientific education.

To-day we are coming to the conclusion that we can get the best, well-rounded, liberal education by a compromise between the two opposing schools, in the study of man and nature.

From the higher institutions this struggle has passed into the secondary schools, the high schools and academies, where a similar compromise is being effected, or a sharp distinction made between the students taking classical and those pursuing scientific courses. Our elementary schools have until recently confined their work to the studies relating to man, to his language and other methods of conveying ideas, to his methods of exact reasoning, and to the way he has divided up the earth.

Everything has been centered about man, as the universe was once supposed to be centered about the earth. Even geography, the study of which might well have brought the pupils into closest relation with their physical environment, has been, not a study of the earth, of our physical environment, but almost entirely a study of a description of the earth, and of a description not to any great extent of physical forces, processes, and features, but very largely of the division made by man, and of the features due to man. The schools have to a certain extent, placed strong emphasis on the so-called essentials, reading, writing, drawing, history, arithmetic and geography.

The children in these schools have studied almost nothing of the other part of their environment, the physical world, which forms such a large part of their life. To-day the old conflict is being waged in these elementary schools. The advocates of science are urging the introduction from the beginning of the child's school life of some study of the outside world which lies about the child.

This is what we call elementary science, or nature study. The terms elementary science, and nature study are both widely used. The first is, perhaps, more exact, and therefore more scientific. Nature study has a less formidable sound, and better expresses the spirit in which the work should be undertaken. It seems much the better term at least for the work in the first four or five years of the child's school life.

Nature study then is a study of physical environment. It is not a study of books. Books may help, they may tell us about nature, but they are not nature. It is not listening to the teacher as he tells about nature, or what purports to be nature. It is not merely

gazing with marked attention at the interested, observant bright boy of the class, as he tells what he has read or seen. This may be studying about nature, but it is not studying nature.

Nature study is not merely a study of nature, but of nature under natural conditions, so far as this is possible. It is not merely what we study in the school room. Nature belongs out of doors, and there we must go to study her in all her beauty and reality. Field lessons are a necessity for the best work. Nature constitutes much of the child's out-of-school environment. He is learning from nature consciously or unconsciously, almost continually. Much of what he thus learns out of school hours in nature's school must be utilized in his nature study in school. When we confine nature study to the school room and school house we shut out the best part of nature.

In order to get the best possible results we would have the children go to nature instead of the book, watch the swelling bud, the developing seed, the opening flower, note the flight and song of the bird, and peep into its nest, glance at the fly or grasshopper, admire the brilliant coloring of the butterfly. We would have our children, like the butterfly, sip a little here, a little there, taste in this place, and in that place. This is better, very much better; where the child is surrounded by nature, yea, almost immersed in nature, it may be an excellent means of arousing in him the interest and sympathy and spirit which are the first essentials in his best development. It may lay the foundations for science; it is on just such foundations that all science has arisen. But if it stops with taking only a taste, if the knowledge is simply taken in and not digested or assimilated, if it is not expressed in an intelligible way to others, it is only the beginning of science. Unless the phenomena are observed or studied in some order, unless their study prepares for and leads to a careful investigation of the relations of the various things observed, unless it results in comparison, in some natural classification by the child, and, finally, in broader and broader generalizations and a better comprehension of the unity of nature, it is not science.

The method, if it may be called a method, so prevalent in many of our schools, of studying without plan or sequence anything in nature which may be accessible or convenient, to-day a plant, to-morrow a stone, the next day a bird and so on, may interest the children, may develop and train the teacher, may be a preparation for elementary science; but it is not elementary science, it is not or does not result in "knowledge classified." To get the best results in elementary science in our schools, we need a clear, definite plan or course of study, with its various parts closely related.

The work of each grade should be adapted to the children of that grade, based on the work of the preceding grade, and should prepare for the next grade above. Then our work will become in truth, elementary science.

The word science is apt to be associated in our mind with the laboratory, and an array of instruments and appliances. The laboratory for nature study is all out-doors; and the only instruments and appliances absolutely necessary are the eye, the ear and the understanding heart. Remembering that all work with children must be based on sense-perception and interest, too much emphasis cannot be placed on the importance of selecting for study material which each pupil can see, hear or feel, and can study for himself, which is closely related to the everyday life of boys and girls, and in which they are or can be interested. Remembering also that as children grow older they are not so directly dependent on sense-perception, and that they gain greater power to apply what has been learned through the senses, to think and reason, we see the necessity of leaving until the later years those subjects such as physics, which require considerable reasoning power. The study of material plants, animals and minerals, is in general the more concrete.

They appeal directly to the senses. Children can only conceive or express forces in terms of things which appeal to their senses. Thus the work of frost is ascribed to Jack Frost. Although they may realize that Jack Frost does not and never did exist, they have not any other way of conceiving and expressing force. They personify force for the same reason that their ancestors, in the childhood of the race, personified and deified the powers and phenomena of nature, the winds and thunderbolts. For this reason it seems better to emphasize in lower grades the study of things, plants, animals, minerals, and to limit the work in physics during the earlier years in school to the study of water in the form of rain, streams, waves, frost, steam and air in the form of currents, drafts and winds, regarded as forces by children because they do so much work. From this we can pass to the causes and effects of heat, phenomena which the children are most familiar, and later, take up physics and chemistry as such, heat, gravitation, electricity, sound and light.

It seems scarcely necessary to add that that is best for study which is most common and familiar. We sometimes seem to think that we must go to distant lands to find wonderful and curious things.

Nature study should, first of all, show the children the wonders at their door-step, the treasures and beauties on which they have been treading all their life. These they have seen and can see every day. Working with these, nature study can relate and make clear old perceptions, and add a host of new ideas.

The most common weeds, the pebbles in the street, or stones of the pavements, the rain and frost which they have seen so often, and yet have never seen, the most common birds, sparrows, canaries, robins and blue birds, the flies and spiders so abundant all about

them, are far better for study than the finer flowers or minerals from other localities, or birds and insects of other lands. After the child has studied that which is nearest, he can make this a foundation for the study of what is more distant.

Teachers will find that each year's experience with nature study will open their eyes to new and better material close to their schools or homes. At first they think they must go miles for what they want. Later they will find just as good or even better material in the very trees under which they have walked for years, along the roads, in the back yards about the school.

This brings us therefore to the element affecting the selection and arrangement of material, the influence of physical and local conditions. Probably the physical conditions having the greatest and widest influence are the seasons and climate. This determines very largely the general character of the material which can be obtained for study. During part of the year, spring, summer and autumn, plant and animal life is abundant. During the winter, late autumn and early spring, in large sections of our country, organic nature is largely dormant.

It seems wise and necessary to emphasize the study of living or organic nature, such as plants and animals during the spring, summer and autumn, and of inorganic or dead nature, as minerals, during the late fall and winter and early spring.

During the spring months the plant world is bursting into life and attracting the attention and admiration of even the least observant pupils. The material for showing development and life is then most abundant. In the autumn the plants are finishing their work, and preparing for their winter rest. It is better therefore to dwell upon plant study during the spring in all grades. In the fall the material for animal study is at least as abundant and as easily obtained as in the spring. Some material, such as caterpillars and butterflies and many common insects is much more abundant. Therefore we should dwell on animal study during the fall months.

This assignment of subjects to the seasons cannot be rigid. Some phases of animal life, such as the return, nesting, life history and songs of birds, and the development of frogs, must be studied in the spring. Much plant work, such as the ripening and dissemination of seeds, the fruits and grains, can only be studied to advantage in the fall. The study of evergreens seems most seasonable in the winter, because they are evergreens, and in the primary grades because of their relation to Christmas. The work for each month will be largely determined then by climatic conditions. The schools in the country have the best environment for nature study; they are surrounded by, yea, almost immersed in nature. The special aim is, therefore, to inspire and develop an interest in the plant as something living,

growing and working, and not as a mere form or structure. To learn about the plant as a whole, the relation and work of its parts, and its life-history, from the seed to the formation of the seed.

To lead the child to see how well mother nature protects and cares for her children. My time is limited, and consequently I shall take up only a few plant forms, such that we are all familiar with, and show you how they may be studied and successfully taught. In the month of September, we find two very interesting plants, the mallow and buttercup.

THE MALLOW.

This is a common weed found in and about dooryards, around the school house and house. It is recognized by its roundish or kidney-shaped leaves, and by its small round fruit, called "buttons" or "cheeses" by the children. This plant is excellent for the first study, because the children are familiar with it, and because it has many interesting habits, such as you have often noticed, the turning of its leaves toward the sun and the closing of its flowers at night.

Lead the children to talk about the work they have to do at home, to tell how they help. Tell them that the mallow, like themselves, and like everything else, has a work to do, and that they are to find out about the work of the plant and each of its parts.

To give direction to the thoughts of the children and the right spirit or tone to their work, read to them frequently, or if they can read, write on the blackboard and keep before them something like the following little stanza:

"It was only a little plant,
But on it did shine the sun;
The wind did caress, the birds did sing,
And it lived till its work was done.

"It was only a little plant;
But it took a gladsome part
In the great earth's life; and at last
Earth clasped it to her heart."

THE BUTTERCUP.

The buttercup does not have the many interesting habits of the mallow (in the spring its leaves turn toward the sun, but not to any marked extent in the autumn.) But it shows somewhat more clearly the spread and branching of the roots, to get nourishment from the ground, the extension of the veins into every part of the leaves to support and carry food to each division, and the protection of the young leaves by the older ones, and will give the children a better idea of the parts and plan of the flower.

All the class work with the buttercup can be done in the school room. But great pains should be taken to have the boys and girls

individually observe the plant out of doors in its home, find and report where it grows, how high it grows, how it lifts its bright flowers up above the leaves, while the modest dainty blossoms of the mallow hide below the leaves. Look for seeds, and see how Mother Buttercup protects her baby leaves and flowers. In the preparatory lesson the teacher may give the children the thought, "The buttercup catches the sun in its cup," and centre her work about this. Get the ideas of the children as to the meaning of the name "buttercup," and have them tell how the buttercup helps them to discover whether boys and girls like butter.

They may have observed that when it is found in fields and pasture the cattle and horses eat the grass all around it, but rarely if ever disturb this plant. Why? If the children taste of it (somewhat cautiously, as it has a decided "bite"), they will discover one way in which Mother Nature protects her children.

The cattle learn that the buttercup is not to be trifled with and better left alone. Some of the sharper eyes of the class may have discovered another of its secrets, the fact that the long stems of the older leaves are enlarged, split open, and hollowed out at the base, making the snuggest kind of a cradle for the tiny leaves and flowers. In the fall this is more difficult to discover than in the spring, as nearly all of the leaves and flowers have developed. Show them how the roots hold fast to the ground and absorb water and food. That the work of the stems is to lift up the flowers and seeds, and to carry to them water and food. Notice the many branches to lift each flower where we can see it.

Show them how much richer is the yellow of the flower when there are green leaves near it and how much prettier the flowers look when hanging loosely and separated than when all in a cluster. Describe the leaves, and impress their form upon their minds by having the pupils compare them with the five fingers of the hand.

Let us make the children feel that the buttercup flowers are the golden cups from which the fairies take their favorite drink—dew and honey. Also read to them the beautiful lines of James Russell Lowell:

"Oh where do you come from, bright flowers and fair,
That please with your colors and fragrance so rare;
Glowing in sunshine, or sparkling with dew?
'We are blooming for dear little children like you.'"

Can not we begin our study of the flowers by putting and fastening in the hearts of the boys and girls thoughts like these? If they get and keep the idea that buttercups are fairy cups painted by the sun, or made of gold carried by the sunbeams straight from the golden sun, and that the flowers are here to bring happiness to boys and girls, and to men and women, will they be apt to pass them by

so carelessly? Review what has been done to make the flower; what the roots did, and how soil and water helped them; what the stems, what the leaves did, and how the sun and air helped them. Place a fully developed, wide-open flower in the hands of each pupil, cautioning them to hold it by the stem and not to hurt the flower. Have them observe it carefully, and tell all they can about it, with as few questions as possible.

Another interesting subject is the falling and coloring of leaves. October is the month of painted leaves. Their rich glow now acquire a bright tint just before they fall, so the year near its setting, "October is its sunset sky, November the later twilight." What a beautiful tribute to the autumn leaves this is by Henry D. Thoreau.

Our best literature abounds in tributes to autumn. Autumn tints and fruits have ever appealed to artist and poet, and the child and the poet are near akin in their love of beauty and nearness to nature. No more beautiful study can be desired than autumn leaves, their beauty of color and beauty of use. Their summer work is done. The tree no longer needs them to breathe, and throw out water, and make food. How beautiful is their leave-taking! They clothe their old mother with all the hues of sunset. Then quietly, contentedly, they slip away.

Good Mother Nature knows what a burden to the tree they would be, how they would catch the winter wind, and hold the snow.

They have other work to do. They drop down not to die. Oh, no! To cover seeds and plants from the winter's cold. To nestle quietly through the months until in the spring and summer, water and air, the two great workers of the world, with their humble helpers, the worms, turn them into food, from which other plants make new leaves and flowers. What busy leaves! Resting, yet always working, always helping.

Let children play among the leaves. Have them collect and press the most beautiful, and decorate their rooms. Dwell on their beauty of color, form and use. It matters little whether the children can draw and describe them exactly. It matters much, however, whether they love them and appreciate the beauty with which God has surrounded them, understand better the significance of the season of—shall I say death? No, of transition, preparation for rest and for other work.

This will give the point of view the vantage ground from which teacher and children can see so much in leaves.

Our literature teems with beautiful thoughts about autumn. Read them to the children, let them commit them to memory and you will be surprised how much they will learn. What a beautiful lesson Longfellow gives us in the following stanzas:

"With what a glory comes and goes the year
The birds of spring, those beautiful harbingers
Of sunny skies and cloudless times, enjoy
Life's newness, and earth's garniture spread out;
And when the silver habit of the clouds
Comes down upon the autumn sun, and with
A sober gladness the old year takes up
His bright inheritance of golden fruits,
A pomp and pageant fill the splendid scene.
O what a glory doth this world put on
For him who with a fervent heart, goes forth
Under the bright and glorious sky, and looks
On duties well performed, and days well spent!
For him the wind, ay, and the yellow leaves,
Shall have a voice, and give him eloquent teachings,
He shall so hear the solemn hymn that Death
Has lifted up for all, that he shall go
To his long resting place without a tear."

Bryant also beautifully says:

"Softly breathes the west-wind beside the ruddy forest,
Taking leaf by leaf from the branches where he lies.
Sweetly streams the sunshine this third day of November,
Through the golden haze of the quiet autumn skies."

In conclusion, let me say that nature study is not merely an aid in other school work, but it is a preparation for practical life.

Our success in life as individuals depends to a very large extent on our knowledge of and power over our physical environment.

Our dependence on physical forces and agencies becomes greater as civilization advances, and man learns to better control nature. The child of to-day must know more about steam and electricity than did the wise man of a hundred years ago.

Our development as a race is very largely due to the fact that we have learned to harness natural forces, and make them do a great part of our work.

Let us make a special effort to develop the power of observation and appreciation in our pupils, that they may not only use and hear but also understand the true, the beautiful and the good in nature.

THE FARMER BOY, HIS ENVIRONMENT, TRAINING AND CHANCES OF SUCCESS.

BY F. S. DOAK, *Frankfort Springs, Pa.*

READ AT FRANKFORT SPRINGS INSTITUTE, BEAVER CO., DEC. 19, 1900.

By the farmer boy, I mean the boy who, as the offspring of farmer parents, is born and reared on the farm and who thus spends his boyhood and, perhaps, young manhood amidst the moulding influences of farm life.

The farmer boy is, in many respects, just like other boys—he would not be a boy if he were not. However, there are some ways in which

he differs and these differences are due mainly to his environment and to the nature of the training he receives.

What may be said of the farmer boy will apply equally well, in many cases, to the farmer girl, but as the girl usually receives the greater share of care and attention, it is but just and fair to consider for a little time the oft-neglected, commonplace boy. While he may not be as interesting a subject to many of you, he nevertheless needs and is worthy of, our most thoughtful consideration.

My own experience and intimate association with boys of all ages for a number of years, has taught me some things about boys in general and the farmer boy in particular. I know something of his surroundings, his temptations and of the difficulties he must meet and overcome if he would succeed. His childhood and early boyhood days with their associations have a marked influence on the life and character of the boy. How often have we all seen him, as a rollicking little fellow of six or eight summers, as he comes through the doorway of the old farm house on a bright June morning. He is a quaint and original specimen of young America as, with patched trousers and old straw hat, minus its brim, and with a hole in the crown through which his long hair protrudes, he rushes off barefooted to have a romp with the dog or calf, with the ruddy flush of health upon his cheeks and a merry whistle on his lips.

He never seems to get tired in doing the things which suit his fancy. It is not wise to let him always do just the things that he likes but his perseverance in so doing is an indication even here that when he finds his proper work in life there will be some stability in him. Don't let him do as he pleases, but give him a reasonable amount of work to do and see that he does it well. Give him, however, plenty of time for play. Let him romp and play in the orchard, the meadow, and gather pebbles by the brook or wild flowers from the woodland hillside, as free from care as the bird that sings in the tree above him, and both you and the boy will be gainers in the end. He may, perhaps, fall asleep beneath the shade of a friendly tree in the orchard and spend an hour or two in boyhood dreams. You find him with his hatless head pillowed in a tangled mass of clover blossoms, blissfully unconscious of his surroundings. Don't rudely awaken him with a gruff command to do some unpleasant task, you may injure him more than you know.

This free, happy life is one of the greatest blessings of the farmer boy and one which no other boy can obtain in like measure. Its influence on his life and character makes one of the chief differences between him and other boys.

The condition of many rural districts and the appearance of many farms indicate the need of better farmers to-day; but if we would have better farmers we need to look well to the material of which

farmers are made. Take the man and make the best you can out of him, but much of your effort will be expended in teaching him to undo the mistakes he has been making; and while it may help him in the future yet will never make it possible for him to regain the opportunities he has lost. Begin now with the boy; start him right and keep him right and his chances will be very much superior.

Surround the boy with the best influences in the home and if he does not love it, it will be because he is not capable. Give him as good a room as you give his sister and one, if possible, that he can call his own. Hang as attractive pictures on the wall of his room as you hang on the walls of her's. The boy loves the beautiful as well as the girl does if his sensibilities are not thus rudely blunted and trampled upon. Make his room attractive. Make it possible for his table to be supplied with the best books and magazines suited to his age, and his ability to read intelligently, and he will more often learn to love to spend his evenings and spare moments there in self-improvement and culture rather than in loafing for hours at a time in places where the conversation and other influences are not always such as would tend to elevate the boy either mentally, morally or spiritually.

"But," you say, "Farmer boys do not always care to read," True enough, but this lack of interest or even dislike to reading could generally be overcome by a little care and thoughtfulness.

Too many farm houses contain but little with which the boy can spend his evenings with the greatest profit. Many are without good papers and have no books, perhaps, except a few old musty ones that have been handed down by preceding generations. Out of these worn and faded relics of antiquity the average boy will not love to read. But boys, as well as girls, will generally read what interests them and if their appetite is not satisfied with that which is wholesome they have no difficulty in supplying it with other kinds with which the markets are flooded to-day.

I knew a farmer a few years ago in whose house there were, perhaps, no books except a few school text-books and an unused bible, and, I believe, no papers at all; yet he had a large family of boys and girls. When talking on this subject of books and reading, he said: "I want my boys to learn to read and when they get older I will get them a book." Two of them were about fourteen and sixteen years of age, respectively, then. When they get older he would get them a book! Such book, when purchased, would as likely be a "History of the Protestant Reformation" or a copy of "Baron Munchausen's Adventures;" whatever the book agent prevailed on him to buy. The first, the average boy would not read and the second were better let alone.

I admit that this is an extreme case but there are others like it and very many homes in which but little reading matter could be found suitable for the boys. There can be no reasonable excuse for this.

At the very time of life when a boy needs most attention is the time when, in the home, he generally gets the least. He may sometimes be coarse and often rude and noisy but it is not always his fault; he is often treated as if that were expected of him. Teach the boy to make good and profitable use of spare moments, but see to it that he has something with which to spend them.

In seeking a place to invest a few dollars the farmer cannot find a better one than in his boys, or one from which he will be likely to get larger returns on the amount invested. Money wisely spent in this way is capital invested for the future and, while the returns may not always be immediate, they will be certain. A few dollars spent yearly for choice literature or something else that the boys could use profitably would often awaken them to a true sense of the importance of life and of their responsibility for filling or failing to fill their proper place in it. This would often save years, if not a whole lifetime to greater usefulness and nobler manhood.

When spending money for fertilizers for his fields and orchards, let the farmer not forget that a little more time and money spent in enriching the minds and hearts of the boys will help them to yield and infinitely more abundant harvest and fruitage of noble thoughts and manly deeds. Such enriching substance will not be of the ordinary commercial kind which fails with one crop, often leaving the soil poorer than before, but will put into the soil of boyhood mind and heart that which will give it the power to further enrich itself constantly, and its power will not only be felt in one life but will enrich other lives, not only for time but for eternity.

I emphasize the matter of literature in the home thus strongly because it is one of the most powerful influences with which the farmer boy can be surrounded. You dare not leave all of this work to the school. The home must supplement the work of the school—they are complements of each other in the training and development of the child.

The educational advantages of the farmer boy are not to be despised; help him to see their value and his opportunities and give him all possible encouragement in his school work. See to it that he attends school regularly and punctually. Neither keep him at home nor permit him to remain away from school except when very necessary; even the fact that it is necessary for him to be absent will never make up to him what he loses by his absence. Remember that in case he fails to get a start now, he probably will never get it.

Demand good teaching but place yourself in a position to demand it by co-operating with the schools in every way that will tend to make them more efficient in their work.

First. The farmer boy must be educated, because to do successful farming requires trained intelligence. Comparatively few farmers are college graduates but farming would be more generally successful and would be a more highly honored business if more were. However, as the majority of farmers will never complete college courses it is important that the boy be given as complete and thorough a training as the farmer can command. The courses of study in the common, ungraded schools of the country are not sufficient and more extended courses of study should be provided by the establishment of a higher grade of schools in which should be taught higher branches.

In these schools special attention should be given to literature, history, mathematics, chemistry and botany. The course of study may contain as many others as can be studied to an advantage but the farmer boy who intends to go no further should, I believe, pay particular attention to these branches.

Literature will help him to be a more intelligent, discriminating reader; history will enable him to appreciate more fully the blessings of our present civilization by showing through what toil and tears and sacrifice it has been bought; a knowledge of soils and of plants and plant growth would enable him to see everywhere about him things of wondrous beauty which but few farmers ever see, or indeed, even know of their existence.

If the farmer boy is taught to know these things he will love them and, I assure you, will seldom leave the farm because he does not love it, or because he thinks its menial tasks beneath him, but because necessity, opportunity or duty calls him elsewhere. Even then he will go with a feeling of sadness that he must lose the blessed influences of the old farm life. Teach him as he should be taught and he will not feel, as some do, that to be a farmer is to be a nothing; he will, on the contrary, feel proud, even in the presence of a king, to say: "I am a farmer." God has never given a more honorable or useful work unto men than that which the farmer is engaged.

Second. The farmer boy should be educated because of the particular kind of knowledge required to successfully manage his farm. Therefore if he intends to spend his life on the farm, he should be trained in the science and best approved methods of farming. His work is work that cannot be dispensed with; the world will always have need of the farmer and is constantly demanding better ones.

Third. The farmer boy should be educated because many farmer boys will and must leave the farm in young manhood and engage in other pursuits which require skill and ability. The past half century has been one of great progress and achievement. Many startling and revolutionary changes have been made; changes which, if we consider them from an economic standpoint alone, will make it necessary for many boys to leave the farm.

Machinery is rapidly taking the place of men on the farm as well as in the factory. However, farm products will be in demand only according to the physical needs of the people while the increasing demand for the products of the factory is limited only by the fancy and the purse of the people. Therefore, there is, and will continue to be a continual increase in the population of cities and, within certain limits, a corresponding depletion of rural districts. The farmer boys may not form a large, but they will form a very important part of this increase. Those who have given the subject long and careful study, tell us that the city would actually degenerate and die within a comparatively short time if it were not for the fact that it is constantly being recruited with strong and vigorous life from the country.

Not only for this but also for other reasons there is a demand for the farmer boy in the city. Though he were able to get along without the city, yet the city could not so well get along without him. The farmer boy is eminently fitted to adapt himself to city life. His "greenness" vanishes in a few days and he is then able not only to compete with but to distance his city-bred rival on his own ground. With these advantages there comes also responsibilities which must be met. He must become a mighty factor in municipal life and government, if not always in official position, at least in example and influence.

His chances of success in the city are superior to those of the city boy, but he should not forget that much if not all of this advantage is due to the strong physical constitution, vigorous muscles and good habits developed in boyhood and young-manhood on the old farm. New fields of opportunity are daily being opened up to the farmer boy who proves himself equal to the occasion. The professions are always open to those who are prepared to enter them and those who are best prepared stand the best chances of succeeding.

Last, but not necessarily least, the boy who remains on the farm may be as successful as the one who chooses his field of labor elsewhere. He may not amass so large a fortune; indeed, he may be in but ordinary circumstances and yet be, in the truest sense of the word, a success. True success is not to be estimated in dollars and cents but in the development of character within himself and in his service to his fellow man. All things considered, the chances of the farmer boy for success are better than those of any other boy if he will but make the most of the opportunities within his grasp.

We are standing to-day on the threshold of the twentieth century; its portals are about to swing wide open to us. True, we have no way of judging the future but by the past, but judging by the past what may we not hope for.

Much, as we have seen, depends on the farmer boy; may he not

be found wanting, whatever his position. Rather, may we seize these opportunities and by our charity, loyalty and devotion prove ourselves true to our neighbor, our flag and our God.

HOME INFLUENCE.

BY ALMA CALHOUN, *Parkwood, Pa.*

READ AT PARKWOOD INSTITUTE, INDIANA CO., DEC. 4, 1900.

Home is the corner-stone of all civilization. Influence is the moral power moved by physical power operating by unseen law, or force to act on, and affect the mind or will.

These directors of our lives turn us either in the right channel or in the wrong. The influence of our home is often thought to be a trivial part. But take if you will the gulf stream as it sweeps through the great Atlantic and see its influence on the surrounding lands. So is the stream, called influence, which sweeps through our home, with its many branches, and winds which waft the impressions on its inmates.

Influence is the prerogative of home to make the first impression upon our nature. It uncovers the moral fountain, chooses the channel, gives the first impulse, sets the first seal, gives the first tone to our desires, and furnishes the first ingredients that will either sweeten or embitter the whole cup of life. Impressions made by the influence are like boring into flinty rock, to erase them we must remove every strata of our being.

Near Saratoga stands a square marble block on which is engraved the form of three heroes of the American Revolution. The fourth side, a plain Why! That place once held by the traitor was lost and stands as a lesson to us to keep burning in our homes the pure, calm, deep and noble stream of light, which shall strike its roots deep in the human heart and spread its branches wide over our whole being that it may be exerted amid the most trying storms of life, and restrain the wayward passions and check us in the mad career of ruin.

Our habits too, are formed under the moulding power of home. "As the twig inclines so is the tree." The tender twig is here bent, the spirit shaped, principles implanted, in fact, the whole character is formed until it becomes a habit. Ask the strong man in the prime of life whether the most firm and reliable principles of his character were not the inheritance of the parental home.

The most illustrious statesmen, the most distinguished warriors, the most eloquent ministers, owe their greatness to the fostering influence of home. Napoleon knew and felt this when he said, "What France wants is good mothers and you may be sure then that France will have good sons." Did not the homes of the American Revolution make the men of the revolution? The Spartan mother and her home gave character to the Spartan nation. But alas! The home of an Aspasia had not the heart and ornaments of the Christian family. Had the central heart of the Spartan home been that of the Christian mother the Spartan nation would perhaps adorn the brightest page of history.

Home in all well constituted minds is always associated with moral and social excellence. The higher men rise in the scale of being, the more important and interesting is home. The Arab or forest-man may care little for his home, but the Christian man of cultured heart and developed mind will love his home, and generally love it in proportion to its moral worth.

Our life abroad is but a reflex of what it is at home. If we use a loud boisterous language and allow the temper its sway in every turn of affairs be sure these threads are woven in life to appear when we least expect them. We should remember that just what we are at home so we will be abroad. If we attempt to appear otherwise, everybody will soon see through the attempt. We cannot cheat the world long about our real characters. The thickest and most opaque mask we can put on will soon become transparent.

Deception most often deceives itself. The deceiver is most often deceived. The parents who pretend to be what they are not soon leave a false impression on the olive plants of the home, and they soon see through these foolish pretensions. Here is where the children get an idea of a true home. They should not get in mind an ideal of a place, but of the character of a true home. Place does not constitute home. Many a gilded palace and sea of luxury is not home. Many a mansion lacks all the essentials of home, for often a hovel is more of home than a palace.

If the spirit of congenial friendship link not the hearts of the inmates and love binds together all the dwellers, it is not home. We are fond of having ideal homes but we too often frame them of outward things—such as a house, a garden, a carriage and other luxuries. Make right the inside and the outward things will care for themselves. In nature everything grows from the heart, so in life influence.

A grand idea of home is a quiet, secluded spot, where loving hearts dwell, set apart and dedicated to improvement, intellectually and morally. It should not be a formal school of staid solemnity and rigid discipline, virtue a task and progress a sharp necessity; but a

free, easy exercise of all our faculties, in which obedience is a pleasure, discipline a joy, improvement a self-wrought delight. All duties of the home when rightly understood are only means of improvement.

As we see the pictures developed in the story of, The Great Stone Face, have we not an illustration of what quiet home influences wrought. Just as Earnest grew, like the feature of that face in the White Mountains, so we are growing like the character which surround us. Let us pattern after that most noble face, the face of Christ Jesus, and grow more and more like him, day by day and we will have a brighter, a purer and a model home. Let us see what some of the essentials are which tend toward a right or wrong influence:

First. That of cheerfulness. It is not only a blessing to ourselves but one of the gems of the home. It argues no talent and beauty, but is a gem that will enrich talent and beauty, supply the loss of either, by no other charm and it is the chief beauty of hospitality.

Second. Patience is another jewel which should deck the home. Look into the home where all are impatient and you see a continual turmoil. Look into the home where patience is a virtue and see the marked change, a blessing to parents and children, a conqueror of all difficulties, a support in afflictions, teaching us resignation and requires the exercise of Christian principle.

Third. Fault finding. This is a habit easily acquired and hard to shake off. The faultfinder is dreaded, feared, and is a disagreeable companion. Better correct our own faults before we constitute ourselves judges of the defects of others. Avoid, therefore, the beginning of a habit that becomes, only too soon completely our master, and try to be blind to evils that cannot be remedied.

Fourth. Co-operation is essential in all departments of the home. If co-operation does not exist between husband and wife they fail to reflect an influence either morally or financially for, do not actions speak louder than words?

Fifth. Negligence may be a barrier in the home. For as soon as one begins to neglect his duty then he has started on a downward course.

Sixth. Courtesy. The foundation of courtesy is unselfishness and a desire to please. What charms would be diffused in our homes, if every member made it a rule to observe all the kindly courtesies of life, making the same effort to be agreeable to each other, as they would feel bound to make in a social circle of friends or acquaintances. Many persons who are the very pink of politeness in company, at home are petulant, rude and tyrannical, keeping the atmosphere that should be most serene, clouded and dull; carrying the face that beams with smiles outside, gloomy or indifferent inside, giving

abroad smiles and courtesy, and carrying gloom and rudeness home to greet those who are dearest to them.

It is not enough to refrain from actual unkindness or gloom; real kindness and cheerfulness must be exerted, to make our homes what they should be—the brightest spot on earth. The man who will carry a costly bouquet to a mere acquaintance, and allow his sister to move a heavy piece of furniture unaided is not a true gentleman, nor is a woman a true lady who follows a like practice, if his or her manners abroad are the most polished in the world. The talents and accomplishments that will charm a circle of friends, will surely make home happier if displayed there. Happy is the home where selfishness is not allowed to enter, and where gentle, forbearing courtesy is the rule of all, where the happiness of all is the consideration of each one.

Serenth. And last, is the responsibility of the parent. There is but one necessity in life and that is goodness, and after this place the desirable things of this life. Therefore parents are called upon to study their children, and surround them with influences that will appeal to the best that is them. If the virtues are fostered the vices will require little attention. Life is a duel between good and evil. These two elements in man are naturally antagonistic. They are continually at war and one or the other must dominate. Strengthen the good and it will be victorious, while the evil will grow weaker and weaker through constant defeat.

Children can, in a measure, be touched by precept. But most of all are they influenced by example. If you have ever been out on a snowy morning when the ground was covered with a deep snow, and have seen a child stretching his legs to walk in the footprints that his father ahead of him had made, then you have a picture of life as the child through his faith in parents, takes it up and follows it as long as that faith remains unshaken.

How great then is the responsibility of them that are so looked to. Some time that child will know whether or not the example which he followed was worthy or unworthy. And how bitter a disappointment it is to find a parent unworthy is known only to the child. How great the havoc is which that parent has wrought in the child's life is known only to God.

HOME.

BY MISS ANNA B. RODGERS. *Mexico, Pa.*

READ AT PORT ROYAL INSTITUTE, JUNIATA CO., Feb. 6, 1901.

It has been said that Mother, Home and Heaven are the three sweetest words in the English language. Be that as it may, the world is full of precious words, grand thoughts and noble deeds. Life is broad, comprehensive and complex, yet all the interests of human life centers in the home. It is the centre and circumference of our existence.

It is for the betterment of our country homes that all these questions of dairying and farming are being discussed here, and every question of public or private policy should be weighed as to its relation to the country home. Every advantage within reach of the home must be laid hold of.

First of all, the home must be worthy of its sacred name. The memories of home are never forgotten. No after-separation can destroy the love of brother or sister. The prayer learned at the mother's knee is never forgotten in manhood or old age, and the memories of home come to the soldier in his dreary night watch on the battlefield, in the hospital, or dying at his post.

A lost home can never be replaced. No public halls, no scenes of pleasure can ever fill that gap, and so we should all try to be cheerful and kind in our homes. We know that cheerfulness is not only a blessing to ourselves and others, a valuable social quality, but a positive duty we owe to our family, our friends and acquaintances. All may possess it. It is the germ that will enrich talent and beauty. Cheerfulness brightens the home. The gloom and shadows that pass over the mind makes us miserable, but the influence of cheerfulness in the home passes over it like pleasant summer breezes, making creation glad. Our homes would be cold and desolate were they not warmed by the genial, sunny rays of cheerfulness.

Kindness in the home is another important thing. It will go further and yield more happiness in this world than all the haughtiness we can assume. A kind, sympathizing word falls like oil upon the ruffled waters of the human breast.

Every kind act we bestow will have its influence, and eternity will reveal it. Let us cherish then the kind heart, full of love for our

fellow creatures and kind words will spring to our lips, to bless and comfort all around us. Its home influence can be equalled by no other charm.

Our hope rests in the possibilities of the country home, in the patriotic spirit of her sons, when in voice of government, a disposition of trust, like the soldier of the present time, they stand patriotic to the homes that reared them and to the valleys that gave free range to childhood.

In the country home man finds an elevating sense of freedom in the open air. The soul feels unfettered when no walls surround him and no ceiling covers. Devotion seems to rise to the very gates of Heaven. The thought expands as if the world attended and the imagination wondered forth exulting like an eagle. We are surrounded with nature's beauties; can inhale the air laden with perfume of blooming roses, and if time permitted, the enjoyment while dreamily resting in a hammock under a shade tree, where the bees hum, the butterfly in gaudy attire flits to and fro, sipping the nectar of the sweetest flowers, with the birds busy building nests about us and singing songs of love and cheer.

Our city cousins, with no care or labor to dull the imagination, like to ramble in the cool and shady woods, beside refreshing fountains, murmuring brooks; they can appreciate and enjoy themselves in full measure in our country homes.

The advantages of country life are so great and apply with so much force to all the members of the home, that it would make this paper too long to treat of them fully. These country home influences have for years filled the cities with new blood, pure from the country families, and has filled the places of trust and honor in the State and Nation with men whose boyhood days were spent on the farm. There are many who wax eloquent in the great duties of life. But let us try to be kind and courteous that we may strew life's paths with a few of Heaven's scented flowers.

TO HAVE AND TO HOLD.

BY LAWRENCE RUBLE. *McVeytown, Pa.*

To be in possession of a thing, and to hold it after it is in one's possession, is the question we wish to consider. You always see the farmer who succeeds busy with his brain as well as fingers. How many of the farmers try to give their boys and girls something to start on, as they say, it is given to them, therefore, they think it came easy, and alas, it goes too easy.

The thing is to hold to what you have and make it improve and not lose what you already have. The hard working farmer (in fair circumstances; not poor, not rich), has a boy he thinks is fairly good. He wants to go to college or start in business; the father has not enough money past him to do this. In consequence, he mortgages his farm, borrows the money, not for a moment doubting but what his son will pay it back in the near future. The boy gets through, graduates with honor and stands in high society. He falls in love with a beautiful society lady, gets married. He needs more money. Where does he send for or get it? He sends back to the farm. In consequence the farm is mortgaged, and the rest of the family drudge the rest of their lives to pay off the mortgage.

Better a thousand times let the boy make his own way, and hold to what you have. Many a hard working man earns his dollar a day and gets his check for it every month, but how often does it go for something that is of no good. Better get something useful, that which you can hold on to.

Benjamin Franklin gives some good advice when he says: "If you would have your business done, go; if not, send." Again, "If you would know the value of money go and try to borrow some; for he who goes a borrowing goes a sorrowing."

A great many farmers are not satisfied with a few conveniences; but must have all the latest inventions and contrivances used on a farm. Now, this is very good and all right if you have the money, but a man, even in fair circumstances, will find "Sheriff's Sale" notice tacked upon his barn door if he does not watch his pocket book. He had better hold on to what he has and gather up gradually.

A farmer may have a good cow, one that pays well for her keeping. Some man comes along that wants a good cow; he offers him a good price for her; he sells and deprives himself of one of the best money makers he has. If you have a good cow, why not hold on to her. The same is true of a good, faithful horse. Too many people are willing to get along with most anything. The farmer has a right to some of the best he can produce. If you have good animals and implements, don't sell, merely because you are offered a fair price, but hold on to them, unless you do not need them.

But there are somethings that we do not want to hold. For instance, that old sheep that has been on the place since before the hard times. The sheep has been offered for sale about 99 times, but as soon as the buyer mounts the pasture fence and alights on the other side, he soon sees his necessity of being on the safe side of the fence, and proceeds to do so with alacrity, telling the farmer he will look elsewhere to purchase. It is known of a man who had several hundred bushels of wheat to sell. When wheat was high he was offered \$1.30 a bushel. Would not take that, but later took less

than a dollar for some. That kind of having and holding does not pay.

I would like to say a few words about keeping the boys and girls on the farm. We know of instances where it is the parent's fault directly that they do not stay longer at home than they do. The farmer boy is too often made to drudge and work without any vacation or holidays or any other time. A boy should have something to call his own; a calf or a pig each year will keep him in spirits; but too often, if an animal is given, when it is grown up it belongs to the old "gent," and will make him a little extra money.

Farmers, give your boys the best you have; don't think you did not have it better, and it will do your children also. If you want to keep the boys and girls on the farm give them a chance.

A few old Plow-Point Proverbs:

"A mortgage on the farm is harder to dig out than a sod of wire grass."

"Not every egg is sound that seems so; and a lame horse makes a lame farmer."

"Waste leads to want, want leads to woe, before you start consider which way you go."

"A weak fence makes a weak farmer; don't let the noon-hour eat up the other ten."

"If you have a jumping cow, fix a pickle barrel for her to jump into, and she won't jump long."

"Rats in the crib gives the team pain in the ribs."

"Little seeds make tall weeds; but tall weeds make short corn."

"Elbow grease and self-denial will make a farmer rich on trial."

"Keep a cat for a rat and the pig will get fat."

KNOWING; FOR WHAT PURPOSE?

BY HOWARD ROBBINS, *Pottsgrove, Pa.*

READ AT POTTS GROVE INSTITUTE, NORTHUMBERLAND CO., FEB. 8,
1901.

I am a believer in the possibility of attainment in the human race. If a busy blacksmith can make himself the master of many ancient and modern languages; if a poor farmer-grocer-rail splitter can become, without going to school, a lawyer, congressman and President of the United States; if a man seventy years of age, by using spare moments can become a noted lawyer; if a young man with a dollar for capital can become one of the great merchants of

the world; if a poor young man back in the sixties can become the owner of a dozen or more valuable farms, of bank stock, bonds, first mortgages, etc., to the value of several hundred thousand dollars; if, by careful study and application, Mr. A can become an authority on bees; if Mr. X can give us a piece of machinery that will do the work of a hundred men better than they could do it; if you and I, by using spare moments could fit ourselves to enjoy life more, to elevate ourselves and our calling, to be more of a success, to help to master and subdue nature, then would it not be incumbent upon us to do our utmost to make these possibilities realities?

But you say, "The cases mentioned are exceptions." Very well; since I belong to the very questionable class which is the cause of so much trouble to some people, because the old-fashioned idea that industry and the performance of duty ought to characterize us is still thought to be correct, rather than the up-to-date idea, with some people, that idleness, and a careless, irresponsible mode of life is to be preferred, I'll tell you of my experience in noting what people may learn.

While at school, I observed young men and women pursuing special lines of study outside the regular course, and doing everything well. I saw young men and women studying almost all subjects from the commonest branches to the highest forms of mental and moral science. To me the interesting part is that they were persons of average intelligence. Yes, and in some instances, they were positively dull in nearly every respect. While on the other hand, here and there was a fine intellect running wild. Pity the possessor of it. Some day he will wake, as from a dream, and then in all likelihood it will be too late. From my observation I am convinced that, barring a few people whom nature has slighted, any person can learn anything; that you and I may think the same thoughts that the truly great men and women of the world have thought. But this is only a fragment of knowledge. Let me know a little about mathematics, reading and penmanship, and I would rather know all there is yet to be learned about things in general than what has already been discovered. Here then is our central thought—*knowing*. Why do we want to know? Obviously because of use; and ornamental, progressive and necessary are the words I have selected to qualify the word use as applied to knowledge.

Now ornament of any kind will do one of three things; it will captivate the eye; conceal a defect; or sway the mind. An example of the first may be discovered in the case of a beautiful woman, elegantly dressed. Natural attractiveness is enhanced by a use of knowledge of the ornamental in dress. The second case may be illustrated by the use of cosmetics; or by what we term a plain or deformed person's dressing so as to have the plainness or deformity concealed. The cultured Greeks hated ugliness, and so do we.

Let us now look to the forensic world for an example of the third use of ornament. Used very largely by lawyers and politicians to conceal the wrong idea, by decking it out in gorgeous plumage, it thus becomes a cloak, and too frequently leads to decisions and acts in which judgment has no part. If you do not believe this, note the decision of juries, and see how frequently a verdict is out of accord with the facts in the case. Then if this is not sufficient to convince you, follow some strenuous orator several thousand miles as he seeks the support of his "fellow-citizens," and hear the shouts of the people as the heroic speaker hurls at them with unerring logic his garbled thunderbolts. I tell you many a man has gone from a political meeting ashamed of himself, because on a calm, second thought he sees he has acted as one bereft of reason.

But there is another slightly different side to this question. It is worth our while to bear in mind that ornament may be inseparably connected with use. Why are buildings painted? Why are certain kinds of fence more desirable than others? Obviously for the twofold reason that fine appearance and usefulness here go together. Do we not also prefer good horses and cattle that present a fine appearance, to those merely good or fine? And, by the way, have you ever stopped to calculate how much more it would cost the other fellow to keep really good stock about him than some he now has?

After all, do we not allow ourselves to be influenced at times by these same considerations in our relation to other people? Isn't it easier for the natural man to learn to regard a fellow-being more highly if the latter be virtuous and of fine appearance? I once heard a young lady say of another who had an unsightly scar on one side of her face, "I always like Miss Blank a great deal better from the one side than from the other." The ancient Greeks thought beauty and virtue inseparable. They couldn't understand how the homely Socrates could be virtuous.

Next, we shall consider the progressive use of knowledge. Little space will suffice for this point, which might also be termed *knowing in circles*. In general, we may say people of like occupation or profession are given to exchanging accounts of experience with a view to entertainment, instruction, or personal satisfaction. We all know that drummers relate, practically, the same yarns. Physicians keep one another posted—in fact, have some knowledge that is almost, if not quite, exclusive. Scientists and inventors are watching one another, eager for something new. Witness Edison and Tesla, and note what fun the incredulous are having at their expense. Then there are those in every community whose delight, and it seems sometimes whose sole business, is to do as the Athenians did in Paul's time. In Acts XVII, 21, the writer says, "All the Athenians and strangers who were there spent their time in nothing else but either

to tell or to hear some new thing." This kind of knowledge sometimes grows or increases as it passes around the circle, hence my term, progressive. May I inflict a few lines of rhyme upon you to illustrate the point?

"Said Mr. A to Mr. B,
While stopping in the town;
'One Mr. X to me remarked,
Smith bought his goods from Brown.'

"Said Mr. B to Mr. C,
Who cast his eyelids down;
'I've heard it said to-day, my friend,
Smith got his goods from Brown.'

"Said Mr. C to Mr. D,
With something of a frown;
'I've heard it said to-day, my friend,
Smith, took his goods from Brown.'

"Said Mr. D to Mr. E,
Who blazed it round the town;
'I've heard to-day' such shocking news—
Smith stole his goods from Brown.' "

We come now to consider necessary knowledge. I use the term advisedly, because the suggestions that shall be made under this head are concerning necessities. I claim that a knowledge of literature, mathematics and some of the sciences is absolutely necessary in order for man to enjoy the companionship of his fellows, to be successful in his vocation, and above all, to be content. Literature is helpful to these ends in two ways: A man knowing nothing about authors and their works is placed at a decided disadvantage if brought into the society of those possessing this knowledge. If he knows, and knows that he knows, self-confidence is his. But you say that he need not commit himself, and fling at me the quotation, "A close mouth makes a wise head." Very well; suppose he is asked to express his opinion. Verily at such a time when he opens his mouth he is likely to "put his foot in it."

Again, in these days of cheap literature we can purchase for a small outlay sufficient books for a year's reading. How will they help in this matter? If we are feeling discouraged we may read something from Burns, or Riley, or Carleton, or any of the host of writers who make us forget our trials. If we feel like tackling something difficult, yet entertaining withal, we may read Shakespeare. If our spirits are too lively and free, we may read something from Lotze or Kant to steady ourselves. Authors are our best friends, and will stand by us at all times, to cheer us, to enlighten us,

and to comfort us. And why should a person know mathematics? Without going into particulars it may be said that after the mechanical stage has been passed there is a positive pleasure in the solution of a problem.

Now as to the Natural Sciences. Few persons have better opportunities to study geology than farmers have. They owe it to themselves, to their families, and to the community to study this subject. It opens up a new world to the keen and thoughtful observer. Every rock contains a record of the past. Will you read it? Again, rocks disintegrating and combining with decayed animal and vegetable matter produce soil, which suggests the analysis of the same. Here we are in the chemist's province. He must tell us what elements are in the soil, and what is lacking to produce a good crop. Unfortunately chemistry is a subject the great body of our farmers cannot familiarize themselves with, on account of the cost of chemicals and the necessary apparatus; but if they are anxious they may have their soil analyzed, and thus learn to use fertilizers intelligently. It is the consensus of opinion, I think, that farmers have been guessing at this fertilizer problem long enough.

It must be admitted that botany has a place here also. Geology gives us the ground, and botany must cover it with vegetation. In this as in all other lines of thought, a little careful reading will enable the most ordinary to become interested, and when once interested there is no end to the pursuit. On the average farm there are sufficient plants to keep one learning for years. With such a knowledge there is indeed "a pleasure in the pathless wood, a rapture on the lonely shore, and society where none intrude."

But the insect is a foe to vegetation. Every farmer ought to familiarize himself with a good work on entomology. If he were to do this, and then use the information thus obtained, many a crop, and especially fruit might be saved. Hand in hand with this subject goes ornithology. Of what use are birds on the farm? Do they destroy your crops? Do not certain ones live almost entirely on vermin? Are you not taking the life of a friend when you kill an owl, or a hawk? If the truth were known it would be found that they repay you several fold for the occasional change of diet which they obtain from your poultry yard.

What then is my message to you? In a sense, I have attempted to clear out the undergrowth, in order that these gentlemen from a distance may be the better able to do effective work. I have talked of possibilities. You have it in your power to make these possibilities realities. Know all you can about things in general, and a great deal about your own profession or occupation. See to the application of knowledge to its rightful use. If you have occasion to apply

knowledge to improve the appearance of things, ornament. If you possess knowledge that will be helpful to another, and on which you have no patent, pass it along and be thankful that you can help another. And lastly, resolve to master a few of the sciences.

THE PROBLEM OF THE BOY.

BY EDMUND S. FRITZ, *Boyetown, Pa.*

READ AT BOYERTOWN INSTITUTE, BERKS CO., FEB. 11, 1901.

Somebody has said, "that the greatest problem of the twentieth century is the boy, with one exception, namely, the girl." I shall not attempt to discuss the problem in all its length and breadth, but shall confine myself to that portion of it which confronts the rural districts of Pennsylvania.

It is a trite saying that "The child is the father of the man;" but it is equally true that the boy of to-day is the controlling citizen of to-morrow. Society is crying for men and women of broad culture, having a greater zeal in their endeavors toward perfection in public and private life, there is not, and never has been, a greater question than the one that is presented to us in the boy. His successful training at present solves all questions, political, social and moral of the future. The child, as the nucleus of the man, is laid at the gate of a new world.

A noted authority says: "That between the ages of eighteen and thirty months, a child learns more of the material world, of his own powers, of the nature of other bodies and other minds, than he acquires in all the rest of his life." The impressions thus made on the plastic mind or the associations once formed in childhood can never be erased. It is for this reason that George Herbert says that "A good mother is worth a hundred schoolmasters."

For the boy there are three worlds: The world of home, the world of school, and the world at large. Every boy as he attains manhood, must take his place and act his part in the great theatre of human affairs, whether this part be prominent or obscure depends chiefly upon the individual; but the nature of such prominence or obscurity is largely decided by his early training at home. Dr. E. Higbee said: "No worthier subject can engage the attention of the State than the proper education of the children thereof." In the last century Alexander Hamilton lamented the reluctance of our people on the subject of education. He predicted that our nation could not attain great

ness until there was a change in public education. Had he lived until the closing decade of the last century, his most ardent wish would have been more than gratified.

It has been said in time gone by, "that education was all well enough in itself, but a man could get along on a farm and elsewhere very well without education." Education does not make the man, nor would education solve the problem of the boys, but that schooling often spoils him, and they point to Abraham Lincoln as one of the best Presidents of the United States, one who they say had no education. But, I reply, if ignorance produced Lincoln, why have we not more like him? The truth is, that all growth is cultivated growth in the man, cultivated by his surroundings in which he is placed, and is therefore education. It is true that there are men and women with natures so rich that no education except such as God and nature gives, is necessary.

John Milton, the sublime poet, said: "I call, therefore, a complete and generous education that which fits man to perform justly, skillfully and magnanimously all the offices, both private and public, of peace and war." It is just along this line that the problem, "What is to become of the boy," is to be solved. Are we to keep them at home, will we try to stem the current which is carrying so many boys from the country home and farm to the cities, where so many of them eke miserable lives. Here is, possibly, a solution to the problem. Let us create in our own communities the means by which our boys can secure better educational advantages, without direct cost to them, and without having to leave their homes, and with the free, public high schools, there should be public libraries, containing good substantial literature, free to all.

The day may be near at hand when the microscope will be as indispensable to the farmer as the plow; when he will harness the lightning to his machinery as he now does the horse. When that day comes, the farmer will not be satisfied with mere instruction in the three R's, but will demand that his children be taught the use of the microscope and the application of electricity.

Stranger things have happened in the industries of modern life. It is not chimerical to hope that agriculture, which in every land has been at the root of advanced civilization, will, in the progress of the twentieth century, be the crowning glory of the most progressive people on the face of the earth. To this end let the township high school be established in every township of Pennsylvania.

Somebody said, "Why do you suggest that all the sciences and agriculture be taught in our public schools in the rural districts?" It may be impossible at present. In many of our schools there are forty or fifty pupils from the a b c's up to geometry, all for one teacher. I heard once a city teacher remark that any body could

teach school in the rural districts; but be that as it may, it will not solve the problem of the boy; but if in this twentieth century we are able to have the township high school and all the sciences taught in a practical way. The problem will possibly have a solution; but somebody may say, "I have had very little schooling, and have lived a successful life." With the environments of this century, friends, there is and will be more education demanded in all spheres of human life.

Some one remarked that the sciences had nothing to do with agriculture, and especially astronomy; but it teaches the change of seasons, causes and time of tides and other things which relate to commerce. Isaac Newton said: "Teach your sons and daughters in the country and cities the grand laws of nature; it will lift them one step nearer to the Creator."

Botany.—How and what has that to do with your pursuit? How many of us are familiar with the two departments of botanical life? I shall use no scientific terms. The flowering plants and the non-flowering plants, knowing the means by which they propagate themselves. In the study of this subject you will also gain a knowledge of those mysterious fungous diseases.

Take the science of chemistry. A great many of the things with which a farmer has to deal or contend with, depends upon laws that are as strict and immutable as the laws of God. I do not mean the higher realms of chemistry; but that chemistry that we come in contact with every day in life.

Entomology.—A knowledge of insect life. We don't want any expensive apparatus to gather these things, and investigate them in the public schools, and discover the various stages through which they pass; but to show the boy the two classes of insects. Those who have gnawing jaws and those that are called suctorial insects. Show the boy the class that are beneficial to the farmer and those that are enemies to the farmer.

Geology.—From what sources soils come, and whether they were formed through the agencies of heat or cold, and transported to the other portions of the earth. Some one has said, and and I myself firmly believe and repeat the declaration again, and I will stand by it, "that if the money that is uselessly and ignorantly expended for commercial fertilizers in Pennsylvania, by farmers applying to their soils that which their soils do not need, that this amount not only would establish the township high schools in every county of the State, but pay their teachers also. There are persons who are using potash when their soil contain an abundance of it. There are persons using nitrogen when their soil has an abundance of it."

Teach Zoology.—The science by which your boy can investigate

the forms of domestic animals, and wild animals that prey upon the domestic animals.

In this problem of the boy, parents, if I had any word to suggest I would say, give your children a good education, an education that lifts them above the lower planes of humanity, and draw them nearer to the One who controls all things. You can give them no safer heritage. The girl and the boy of the future will need more education than of the past. In the future even more so than at the present, the person without a proper mental culture, will be obliged to stay in the rear, or even to be a stranger in the world's onward march through life.

HOW TO LIGHTEN THE LABOR OF THE FARMER'S WIFE.

BY MRS. MANETTA BINGHAM, *Cleareview, Pa.*

READ AT PLAINGROVE INSTITUTE, LAWRENCE CO., JAN. 3, 1901.

There are only two ways of making any labor more light: One, is to lessen the number of tasks performed; the other is to discover, adopt, or obtain easier ways or better methods for doing the work.

No class of women in our knowledge are expected to labor so hard, nor so long as the wife of the average farmer—oft-times is compelled to do—by sheer force of her circumstances and surroundings. The store, the grocery, the butcher and baker shop are far removed, therefore, the meals on her table, must at all times, be largely, the production of her own hands, even to the smallest detail. She must be prepared to entertain unexpected company on short notice, and with a good, square meal, or she is considered, to say the least of it—not a fit fore-handed, and this is a small part of her work, when we come to think carefully.

Woman's labor is supposed to consist of washing, ironing, baking, cooking, dish-washing, scrubbing, sewing (including mending and darning), and then, that endless cleaning, cleaning, cleaning, evermore, which as we ask, when 'twill be finished, comes the answer, like Poe's Raven, "Nevermore." A formidable array, truly, and enough to appal the heart of any one except the wife of a Western Pennsylvania Farmer.

Many of us would feel we had struck "an haven of rest," could we but know that this were all. When added, thereto, we have milking, churning, care of calves and poultry, advising about this, prescribing for that, caring for the sick and waiting upon the well.

Attempting to lighten any of these labors by lessening their number, is a rather delicate matter, requiring great tact, skill and shrewd-

ness. Each woman must determine for herself, just how far she dare venture, and then move with caution. We have known serious trouble in families by a little rashness along this very line. For be it remembered in the labor-lightening process, it is well to obey the scriptural injunction and put not our confidence in the "sons of men." Woman, don't you know, was given to man "for an help-mate." We presume Father Adam pronounced it *help* mate, with strong accent on the first syllable, and all mankind "descending from him by ordinary generation" have learned to do likewise. To the general existing conditions in the great human family known as "tillers of the soil," there are, however, exceptional features, these in justice to all concerned, must receive due notice and consideration. A gentleman of our acquaintance has saved his wife much hard labor, for several years past by a single act. He bought a revolving churn, a good one too—but, his wife, owing to imperfect heart action, muscular weakness of the spine or something either real or imaginary could not run it, so he does the churning himself. Many of our brethren doubtless have done as well, or better. To all such we offer everlasting appreciation and gratitude. They will surely be rewarded in due time, if found continuing on in well doing. On the other hand, we may find women, the wives of well-to-do farmers, who keep themselves in a continual state of impatience, over-work and over-worry, nagging husband and children into fits of desperation, or converting them into mere money-grasping machines, as the case may be, according to their temperament; all because of a feverish desire to outshine their neighbor—to have in their view, some wonderful achievement over which to boast, or most likely to satisfy an inordinate love of finery in dress or various foolish expenditures, perhaps quite beyond their means. Of this class of women, for them, or to them, it is worse than useless to speak. Like Ephraim of old, "They are joined to their idols, let them alone." Lacking the essential elements of good judgment, or sound, common sense, their labor being of their own choosing, they can lighten it as they see fit.

No true woman will seek to lighten her labor, multiform and manifold through her tasks may be, by slighting her work, therefore, the only hope of relief lies in easier ways, or better methods. This requires thought and care, brain rather than muscle. We must accept as good counsel, the old maxim: "Make your head, save your heels." Nothing is gained by rushing pell-mell and hap-hazard, like a runaway locomotive, but learn rather to think first and calmly, then work quietly and steadily, never deliberately put off till to-morrow what you can just as well do to-day—thus helping your work get ahead of you as it is likely to do so very often despite our best efforts to the contrary. Avoid carefully much superfluous furnishing in any part of the house. Good in quality as our means will al-

low, plain, substantial, comfortable and neat; rooms thus furnished is more never-wearing than "tidies and scarfs" hanging askew and bric-a-brac strewn about, fussy, mussy and dusty. To keep such useless appendages otherwise requires constant care.

By all means have kitchen, dining-room and pantry well supplied with every necessary appliance. These are plentiful now and cheap, such as pans of different sizes, kettles, cooking spoons, graters, dusters, dish towels, egg-beater, toaster and be sure to have a pint and quart measure. Keep these in some degree of order, of course, but never hidden in a promiscuous jumble, somewhere out of sight, and consequently out of mind as well. Instead, have them arranged just at hand, near where they are to be used, thus saving much time and many steps. In addition to these, have a good washing-machine, clothes-wringer and plenty of tubs and pails for general purposes.

If possible, take some good household magazine and read it—if means will not allow of this, be sure to note carefully the household columns of farm and church papers, these should be in every home, whether bonnets and wraps changed with the fashion or not. In our reading, we can learn to prepare good substantial dishes, requiring the least time and labor, satisfying to the appetite and often really elegant as well. Poor economy to tussle along with old rusty, worn-out kitchen utensils, that we may invest their price in feathers, and fur-belowes galore. On this phase of our subject suggestions might be multiplied since they have all been written and read again and again, we turn to another more important and not so nearly under our own control. Consequently more helpful, could we but have it, viz: The hearty co-operation and sympathy of husbands and sons.

We have no desire to make paths for the feet of others, and yet, we must here mention a few things that if we were men and boys, we would and would not do. We would seek to lighten the labor of wife, mother or sister, by not throwing our clothes about, here, there and everywhere, we would not mislay every thing we used, and then ask them where they are, or expect them to be found at a moment's notice. We would not allow our "tobacco habit," to give them extra labor, with confusion of face and of stomach. If we were a married man, we would not by our indifference, selfishness and neglect lead our wife to feel sometimes (perhaps many times), that she would better be "tied for life" to a hitching post. We would not oblige her to ask, like a beggar at a gate, for what we once promised before God and man to give. Having induced her to take our name, to help bear our losses and our crosses, we would "switch off" occasionally from our own plans and purposes, to notice if her shoes were worn out, or her best dress shabby, to notice a little, when her work was hard and heavy and offer a word of sympathy or a help-

ing hand. In brief, we would try to remember that we were partners in the same concern, its success dependent on our mutual labor and to act accordingly.

We hope not to be understood as charging these sins of omission and commission on mankind in general, yet we all know they are to be found in practice occasionally.

In conclusion, we will notice what is to our mind the most helpful thought of all. Nothing will lighten our labor so much as to have right views concerning it. We must be self-respecting, contented with our lot in life, love our work and take a proper degree of pride in it. To be sure this is not always easy and natural, when we think of the women in other walks of life, who live in ease and comparative idleness, nevertheless, with Divine help, and the sturdy, persistent exercise of our own will power and common sense, it can be acquired. We must discipline ourselves until we can put our best force, energy and spirit into our work. We must study to economize our efforts and apply our labor to the best advantage, by giving to it our best thought instead of regarding it as mere drudgery or slavery. To this end with wisdom let us "count our mercies." If she will to be so, the farmer's wife can be thoroughly independent as no other woman can. Society cannot crowd her hero, saying, this far no further. Fashion cannot sway its scepter over her, saying, you must do this or that. Surrounded by pure air, pure influences, freedom of thought and action, she can rule her own domain, if she will to do so.

Lastly and very best of all—to lighten our labor, learn to look always on the bright side, make the best of the present, hoping ever for better things in the future. Brooding over the sorrows, difficulties and failures of the past, serves only to stupefy the senses, causing us to yield helplessly beneath every burden. To be a woman in the true meaning of the word, is to arise to every emergency with christian fortitude. With heroism of soul, to outshine every dark cloud of discouragement, with strength of character to subdue every oppression, patiently persevering unto the end. And this great principle is not for great trials or terrible calamities only, but should be carried into the realities of every day life and labor.

CULTURE OF FLOWERS.

BY MARY S. FISTER, *Lynnpport, Lehigh County, Pa.*

Flowers and very beautifully defined as the "ornaments of vegetable existence."

Culture consists in fostering care, hence by applying culture to flowers, we mean the care and attention given, and also required, in furnishing home and surroundings with beautiful fragrant flowers. Culture is also defined as the sense of beauty in nature. This is a good definition for flowers as culture certainly beautifies them. Since culture beautifies the flowers, and culture of flowers is a very refined occupation, so indulging in it has a tendency to beautify the mind. Why not follow the work to some extent? You find a great deal of refinement slumbering in that person who has a love of flowers. The poet Wordsworth says thus:

"To me the meanest flower that blows can give
Thoughts that often lie too deep for tears."

The most beautiful thoughts are sometimes suggested by the meek little "stars of earth" that grow by the road side, without culture even. It is a fact that culture in humanity has the power to uplift the tiny flower, unnoticed by the stern eye of that person who has no love for the beautiful. Should we find a person so disposed and trace the annals of his life we might perhaps find a flaw or lack of self esteem. God created the flowers as a reminder of the eternal bliss into which this mortal frame of ours is to pass after our earthly pilgrimage is done.

Few objects are better adapted to refine the taste than flowers. They have become almost endless themes for poets and have furnished the minds of sculptors and painters with lovely forms and pictures.

Persons who have a great deal of mental labor, the hardest work existing, find no better source of recreation than a few hours daily in the flower garden "among the lilies." This has a tendency to draw the attention away from books, and makes clear and bright the weary brain, and fills it with an abundance of new and better thoughts.

There is no color-line in the flower garden. From the majestic sunflower, towering above her sisters of the garden and faithfully turning to welcome the god of day, to the humble violet which closes its cup before impending showers, there is scarcely a single flower

which may not from its beauty, perfume, and classical association, be the source of sublime thoughts and feelings, especially in the world of poetry and art.

The earliest flower in our part of the country is probably the snow-drop that certainly has a tendency to awaken a new spirit of enthusiasm in the hearts of humanity after the weariness of a black dreary, desolate winter scene is past. They are the forerunners of spring and remind us of the fact that another leaf in life's history has been turned and a new one begun. As imagination fancies a saint to shine in heaven, so memory pictures the snow-drop shining through that white sheet which decks the earth during its course of blossoming.

There are so many early flowers that it matters very little which one we take into consideration. During early spring the air is already scented with perfume which is carried by gentle zephyrs from one place to the other over the renovated fields and these mortal frames of ours.

When looking upon the lily even by its color we are led to entertain the thought that it is an indication of purity like the snow and we can not help but refer to the passage in the bible: "Consider the lilies of the field how they grow. They toil not neither do they spin; and yet I say unto you, that Solomon in all his glory was not arrayed like one of these." Of the forget-me-not let us merely make mention and let it tell its own story.

Let us not miss the lady rose. In the poetic world the rose stands first. The reason for this is unknown unless it is owing to its exquisite combination of form, color and perfume which has entitled this queen of flowers to be classed with the nightingale in one country, in another country to be chosen, with the distinction of red and white, as the emblem of two honorable and royal houses. Although the rose has such a prominent position in the yard and receives so much care; there is a flower blooming by the roadside during the whole summer, which needs no cultivation yet smells as sweet if not sweeter. This is often the source of pleasure to weary travelers stopping by the wayside to take a rest. This beautiful flower is the wild rose in all its glory ornamenting the street where it has to stand alone with nothing to modify its beauty.

It is a peculiar fact that culture destroys the scent of flowers. The more highly cultivated a flower becomes the fainter the odor. Flowers are cultivated more for fragrance than beauty and since cultivation spoils the scent, cultivation is of some disadvantage. Pope's lines contains some truths: "If vain our toils, we ought to blame the culture not the soil." In order to have blooming flower stalks the year round, we ought to make a selection of flowers for the different seasons. Spring is the season for tulips, crocus, hyacinth, ane-

mones; summer is blest with roses, pinks and carnations; autumn has the National flower, heliotrope, verbenas, fuchsias, petunias, and last, winter has the chrysanthemum the forerunner of the "Merry Christmas" season assigned to it.

The common colors of flowers are yellow, orange, white, pink, scarlet, red, blue and purple. These colors may become more brilliant by cultivation, change of soil, and climate. Change of soil is the best means of increasing the beauty of flowers. Kindred flowers are often advantageously improved by cross fertilization, i. e., taking the pollen of one flower and putting it on the other. Most beautiful flowers have been cultivated in this way already. Flowers may be caused to assume different colors as, blue ones may be caused to become white or red, but not yellow and yellow flowers may become white, or red but never blue. It is a common thing to see pink roses and white ones on the same stalk. The hyacinths which are blue will often produce almost any color of flowers excepting yellow.

We may stop to talk a little about propagation of plants. This takes place in different ways: by sowing seeds at the proper season, by dividing the roots, by pipings, by cuttings and bud grafting.

Suckers are the young plants growing out of the ground near the main stem of a plant and are carefully taken out of the ground with some roots attached to them. They should not be removed till spring after the plant has begun to grow. If they have buds, these should be removed as their removal increases the vigor of the plant. A large majority of the herbaceous perennials are propagated by dividing the roots which is the simplest way of propagation.

In piping we take the top off of the young shoots close below a joint. These pipings ought to be put in water for a week or so before planting. We should not dibble a hole to plant them but thrust each piping gently down half way into the soft earth ready to receive them. Water them often if the weather is dry, but only to keep them moist. Shield them from the hot sun.

A cutting is a strong shoot of last year's growth cut from the parent stem and set in the ground. The cutting should be about six inches long and cut off slantingly. Roses are the principal flowers propagated in this way. Budding is a method employed in propagating fruit trees but may be used on rose bushes, too.

The flowers are classed under two great heads, Phaeogams or flowering plants and Cryptogams or flowerless plants. Under the latter we have ferns, palms, mosses and certain sea weeds. Aged people generally are very fond of ferns and palms.

It is sometimes very amusing to study flowers. Carnations are said to mean disdain; roses truthfulness; lilies purity and sweet peas departure, which I now beck to do.

ADVANTAGES TO THE FARMER OF DIVERSIFIED KNOWLEDGE.

BY W. J. REMALY, *Moorestown, Pa.*

READ AT MOORESTOWN INSTITUTE, NORTHAMPTON CO., JAN. 7, 1901.

One of the most serious questions to-day, in my estimation, is how to spend time? Or in other words, how to make the best use of time? It was all right centuries ago, when men became twice as old as now with no competition or hardly any, to take things by chance, or let luck come their way; but that time has passed. The man who is one of the "go easies" in our day will stay a "never-get there." It is no more the man with the strongest back, the stoniest tendons and the greatest strength that comes out as a victor in the race. The cry is no more for only physically strong men, but first, for men of mental strength. The cry of the soil is not so much for simple farmers as it is for educated ones. The day has passed when the only requirements for a successful farmer were a little knowledge of how to hold a plow, or operate a currycomb, with enough schooling to be able to read the dates in the calendar or add on the fingers.

The farmer, or what we should rightly call the agriculturist, needs brains, practical knowledge, science, yea every farmer should be a university graduate in our day. He should be equipped with a knowledge equal to, and even surpassing that of the professional man or specialist. He should know what? Well it would be good if he would be a mathematician, well acquainted with the higher mathematics. He should be a linguist, well versed in the modern and ancient languages. He should be a botanist, a geologist, a chemist, an astronomer, be well versed in philosophy; have a good commercial education; have a fair knowledge of civil engineering; have a knowledge of law; in a nutshell, a farmer should be the best and widest educated man of any class of people on God's green earth.

You undoubtedly think that I am trying to fill you with a lot of stuff which is not worth a red copper to you. On account of the limited time for each speaker, I will not be able to prove the foregoing, or make it clear enough to fully understand perhaps, but I will try and set you to thinking at least if possible.

In the first place, you farmers and farmers' wives think not that you are too old, and that your opportunity has passed by; neither think that you cannot afford it, or do not have the time in your old

days. You who are even fifty years and more do not think that you are too old to do some thinking and studying yet; though it stands to reason that this can best be accomplished by younger men and women, and especially the farmers' boys and girls.

But before I will try to tell you how this seemingly impossible thing can be done, let me cite a few of the world's master minds and in what way they accomplished their success, and from what positions they rose. Richard Arkwright, the inventor of the spinning-jenny and the founder of cotton manufacture of Great Britain, worked in his younger days as a barber. At the same trade Lord Tenterden worked, who later became one of the most distinguished Chief Justices of England. "Strata" Smith, one of England's greatest geologists, was a farmer boy and followed the vocation for a number of years. Shakespeare was a poor country boy; his father being a butcher. Brindley, the engineer, Cook, the navigator, and Burns, the poet, were day-laborers. Ben Johnson worked as a mason with a trowel in his hand and a book in his pocket. To the same class belong Hugh Miller, the geologist, and Allen Cunningham, the writer and sculptor. These men all got their education by self-study, hardly one of them was ever an hour in school. Stothard learned the art of combining colors by closely studying butterflies' wings. Beewick first practiced drawing on the cottage walls of his native village. Benjamin West made his first brushes out of a cat's tail. One of the vergers in the cathedral at Pisa, after replenishing with oil a lamp which hung from the roof, left it swinging to and fro. Galileo, then a youth of eighteen, watched it and conceived the idea to measure time. After working fifty long years, he was successful and gave to the world his great invention, the pendulum.

These great men were true sons of perseverance—of never ceasing industry and toil. Time saw them once as weak and helpless as any of us. It illustrates what each may do if he takes hold of life with a purpose.

Granville Sharp, a clerk in the Ordnance Office of England, devoted his spare time to reading volumes upon volumes of English law and succeeded in freeing the slaves of England and founding the colony of Sierra Leon.

Now and then a man stands aside from the crowd and labors earnestly, steadfastly, confidently, and straightway becomes famous for wisdom, intellect, skill, greatness of some sort. The world wonders, admires and idolizes. I do not want you to think that by these few remarks I want to make you all intellectual giants, but if you will do what I will shortly state I feel confident that you will be greatly profited thereby.

In the first place, remember that every act rewards itself, and that not in nature but in man is all the beauty and worth he sees. "The

world exists for the education of each man." It is not necessary to go away to school to make a man of wisdom, but he must have a few things, without them he remains an ignoramus. The first, is no ceasing toil. The second, is your mind centered on the one subject, that of improving. The third, make the best use of time, never waste a minute. Learn to use time as the miser learns to hoard money. Do not leave a minute slip by without thinking something useful. If you are master of the three "musts," then comes the secondary part. That is, you have to be a book-keeper and a good one at that, but somewhat different from the office book-keeper. You want to have a large ledger and a large diary for your office, and a small note book for your pocket. Well what then? Before I will answer that I will ask a few more questions which I will not answer but will leave each one think along those lines and see if they can not already find some work, and begin their diaries. Perhaps at first thought you may say they are foolish but I bid you to think, think, think, and perhaps after all it may seem as something. The questions, or things I might call your attention to are so many that I really don't know which ones to state, but as a mind-opener I suppose the following will do.

What compounds, or elements are required to produce a stalk of wheat, rye, oats, buckwheat or corn? What elements predominate when the soil is of a blackish, reddish, or whiteish color? Can you analyze soil? Do you know what minerals are contained in the stones lying around your fences, if any, or from the law of nature what strata lies next to the subsoil?

Will it give more stalks if you sow a long kernel of wheat than a more set one? How can you keep the insects out of your grain in field and barn? How long do the different kinds live? When are they the most destructive? Through how many stages do they pass? What do they eat? What is the entire cost to you, labor reckoned in, to raise a bushel of wheat, rye, oats, or a head of cabbage, or peck of beans? How can insectivorous birds be induced to multiply more rapidly? What are the names of them? What are their habits? What do you know of all the birds in your district? Could insectivorous birds and songsters be brought from other countries and do well here? If so what kinds? How much poison is there in the holly-hock or daisy? How much oxygen does an oak leaf give out in a day? In a summer? How much moisture does a chestnut tree collect? Can you always say what kind of weather we will have the next forty-eight hours? Remember the Indian could. What per cent. of moisture will collect on your corn field if you harrow two inches deep or cultivate four inches? Will it be better to plow eight inches than twelve? Do you know how long it will take for an oak, chestnut, maple or cedar to grow three inches

in diameter? Six inches? Do you know the names of all the trees? Which are the most useful? Which will be so in time to come? Do you know how much nourishment a horse will get from four quarts of oats and twenty pounds of hay? Do you know how far that nourishment will go for drawing a load? Can you tell by looking at two machines of the same make which is the better? In which one is the casting the strongest? Or if the wood is having its fibers running in the right direction for the greatest strength? Or the amount of strength required in pounds to operate the machine? What pressure must each part be able to bear? Do you know the names of all the weeds not only on your farm but in your district? Do you know how fast each grows, and what seed each bears? Do you know the best way to get rid of each kind? Do you know how much nourishment a brier requires? Do you know how far that nourishment would go towards making a bushel of wheat? Should you plow a hilly field early or late? Do you know your fields as you know your children, their very nature? The strength of how many pounds must the hub of a wheel be able to bear in order that a ton may be loaded on the wagon? How many pounds of hay of the different kinds are required to make a pound of milk?

So I might go on all night asking questions and not have half covered the field of knowledge open to us. Some of you will say such questions are impossible to answer, but I say confidently that to the persevering they are possible. Again, let me ask how do you spend your evenings? Your rain-days, your morning hours, or your rest-a-little on the plow handles or under the shade trees? Grand time to get out your little books and note your bright ideas, which you may have forgotten till evening. Note your observations, your experiments. In the evening get your big diary, note the date, then write out your thoughts, observations and experiments in detail, even if you must work an hour or two, your sleep will be all the sweeter for it. If you do that every day for ten years you Northampton farmers will have the distinction of being among the wisest farmers as a community in the whole United States. Then go to your neighbors sometimes while you are studying up different topics, take your diaries with you, compare notes and learn that way.

"Tis true we may not all be great,
But more could be than are."

Are you not in the very midst of nature? Has not God spread his great book open before you? Has he not endowed you with reasoning powers, with eyes and with ears? Therefore I say hear, see, reason, and thereby you will not only fill your mind with precious gems, but your pocket-book will also grow fat. Wordsworth, the great poet of nature says:

"The world is too much with us; late and soon,
Getting and spending, we lay waste our powers;
Little we see in Nature that is ours;
We have given our hearts away, a sordid boon!
This sea that bares her bosom to the moon;
The winds that will be howling at all hours, and are gathered now like sleep-
ing flowers;
For this, for everything, we are out of tune;
It moves us not--Great God! I'd rather be a Pagan suckled in a creed out-
worn;
So might I standing on this pleasant lea,
Have glimpses that would make me less forlorn."

I know that our farmers do a good deal of newspaper reading. But how many get the true worth out of their paper. Some read the paper to see who died, others who married, one to see who was visiting, another who got killed, a few to see market quotations and the rest where the next public sale will be. That is right, we always like to know the latest but it will help very little towards our intellectual improvement. When you pick up the paper don't commence at the top of the first column and read everything down to the last page to the end of the last column, but first glance over the headings and see what is worth while to read. After you have done that then read, but not until you have your pencil and note-book in hand. As you read something new and interesting to you make a note of it and so on until the paper has been read. I would say that anything that may be of future value should be noted, like crop reports how they look, or failures, or estimates of them. Note those things all on your books. Why? Well for instance, it is in early fall, you would like to know if the different cereals are going to be higher or lower later on. You turn to your books and see what it says there (of course you must remember the more years you have been keeping faithfully your books, the surer you can say) you note the different failures in the different countries, you add them up, then see if it is more or less than the yearly need or yield. Also see in what states or countries the failures and the good crops have been. By so doing for a few years you will be able to make every year a snug little sum of money by turning in your grain at the right time. Again, note the market prices of all farm products from day to day, and also the cost of things which you buy. In this way you can save many a dollar in a year. You may not be able to do so the first year but you can in a little while. Suppose you read in the paper that a violent storm swept over the West Indies and the Southern States, destroying thousands of acres of sugar-cane. Note it, turn to your books and see whether the average still left is sufficient to supply the markets for consumption.

If it falls short, go to your grocer next morning and order a supply of sugar for the next ten months, because sugar is sure to advance in price and you will be able to save enough money on that article to buy a piece of machinery. So we can find dozens of uses you can make of your gathered knowledge. You will all admit that farming will not pay if you will have to depend upon brute force alone; it is only the wide awake farmer that can make it a paying business.

Now a few more words in regard to the keeping of your books. In the first place for the sake of economy, time and ready knowledge, you must have a system. Each one can make a system for himself. But for example I will say that one of you has a note book. You gather knowledge all day long. In the evening after you are through with all your work, sit down, take your note book and make your entries in your diary. Now all depends how earnest you are to gain knowledge. If you are very earnest and want to specialize I would advise you to have a good sized book for your diary and a common size ledger, not ruled would be the best. Now suppose your notes for the day would be about soil, horses, thistles, chickens, shrubs, plowing, etc. I would put everything in the diary; then proceed to your ledger, see on what page you are treating the subject of soils, turn to it and write down whatever knowledge you have gained. Take the next subject and do likewise and so till you are through. Of course you want to note your topics alphabetically in the front part of your ledger to save time in looking for the different ones.

It will require some work to start it, but it is one of the simplest things, and in a short time you will find it a source of constant pleasure. It will only cost you a trifle to get an outfit, any note, or blank books will do for a start. Those who will try it will never be sorry for it I can assure you. It will be one of the best investments you ever made.

Farmers who have boys and girls at home will find it of double profit. Get the children interested in it by being yourself interested in it and they will spend their evenings in the family circle instead of going somewhere else to while away time. Not only that but you help them to lay the foundation of success, self-seeking knowledge.

I do not want any of you to have the impression that I only mean the farmer, I mean all, women as well as men, regardless of what occupation they follow. And neither do I mean that you have just to get your knowledge in the way I mentioned, but in any way. Read good books, make notes from them. Any way just so that you get knowledge. Did you ever think how much precious time is wasted; why the majority of us are reckless spendthrifts of time. Now I know that you will think lightly of this but if there is only one father here who will start it for his son or daughter and help to carry it on, I feel satisfied that my talking or reading what ever you want

to call it was not in vain; because I know those of us who live long enough will hear later of that farmer's son or daughter. But if you start it don't get back in the old rut again in a short time like the following given by a Lewistown Journal, says of a case up in Maine.

A certain old man who does handsome work with the fiddle at country dances is "great on time," but unless he is argued with he will play "The Girl I Left Behind Me" from eight o'clock till twelve, for every dance except the Virginia reel.

Some of the old dancers were on the floor not long ago, and between dances one of them went up to the fiddler, who sat rubbing the rosin on his bow. "Uncle," said the dancer, all the folks on the floor want you to play old "Speed the Plow" for the next dance. Can't you give it to us?

The old man tucked his rosin into his pocket. "I sh'd like to 'commodate ye fust-rate," he said, "but there is suthin' sing'lar 'bout that tune of 'Speed the Plow.' Jest as soon as I 'Speed the Plow' 'long a little ways I run into 'the Girl I Left Behind Me.'"

If you do that you are worse than the greengoods or the gold brick man.

FLOWERS, SALT, SOAP-SUDS AND TURPENTINE.

BY PROF. A. M. VANTINE. *Uniontown, Pa.*

READ AT UNIONTOWN INSTITUTE, FAYETTE CO., FEB. 22, 1901.

We talk of our stock, our grain, our fruits and our vegetables, but rarely, if ever, speak of the decoration of our farms, and the grounds that surround our homes. A tidy house is the pride of the owner of it, and the influence of tidy house-keeping extends farther than the walls of the house, over which the housekeeper is the queen. An observer in our city can tell the tidy, well-kept homes, by noticing the front step and the pavement, so an occasional traveler can pick out the well kept houses and thrifty farmers, by noting the condition of the fences, the buildings, the yard and the garden.

No other decoration adds so much to the beauty of a place as a few well selected flowers, and some shrubbery, nicely arranged. The cost of which is so trifling that it need be no excuse for not having these beauties of nature around us. There is no reason that the front yard should not be decorated with beautiful flowers from long before the last frost leaves in the spring, until long after the first comes in the fall.

Let us see; make a deep, rich bed, about four feet wide, any length convenient, owing to the size of your garden. First plant crocuses, of which there is an endless variety, then comes the hyacinth, the heather moss, followed by the Easter flowers, king's crown, jonquil, then the fleur de luce, the dilytra, and the lily of the valley, the blue bell, the narcissus, the pinks and the sweet williams, the numerous varieties of peony, the white and the tiger lily, followed by the sweet scented yellow lily, the holly-hocks, and the endless varieties of perennial phlox, followed by several varieties of hibiscus, and you will have a mass of bloom from the middle of march, in ordinary years, until the latter part of July, when the annuals begin to show themselves.

Right along with these are varieties of beautiful shrubs, which start in with the canary bird flowers in March, then the German quince, the early syringa, the many colors and kinds of beautiful roses, the snow-balls and lilacs, the wygelia, the daoutchie, the late syringa, the spyrea, the rhododendron, the cornucopia and the white fawn, the honeysuckle, the althea and hydrangae, as well as the numerous others of equal beauty and economy.

Now come the annual plants to take the place of their perennial predecessors, which have served their time and purpose. Of all these flowers, I would select only tried and true varieties; for if you read some of the catalogues, you will see there varieties of annuals advertised that you know nothing of, and if you begin to experiment with these, you will be discouraged with your efforts, and your flower garden will be a failure, and besides, you may bring a weed of the most stubborn kind into your garden, that will give you no end of trouble.

It is said that two pioneers to California took with them respectively a scap of bees and a bunch of Scotch thistle seed. The bees have proved one of the greatest blessings of that most wonderful State, bringing it an income of thousands of dollars yearly, while the curse of California to-day, is the Scotch thistle, besides, it costs the State thousands of dollars yearly to keep it, in some places, from entirely destroying the crops. So take care what you plant, and be sure that it is the right thing. I would suggest a lot of good old fashioned flowers; the asters, the zinnias, the sweet peas, the scabiosa, the balsam and the balsam apple, the morning glory, and the nasturtium, the larkspur, the morning bride; not forgetting the petunia and the marigold, also Job's tears, which our good old grandmother used to fix up for us in long strings and hang them about our necks, to keep off such dreaded diseases as the whooping cough, measles, etc.

Set out a long row of sun-flowers and you will combine beauty with utility; a few datura mixed with the many varieties of tried and beautiful fall blooming annuals can be worked into your bed where

the early blooming perennials were, and you will have a lawn that will cost but a trifle, and will afford you untold pleasure, and your neighbors no end of satisfaction in seeing the thrifty and pleasant surroundings of their friend.

I have just one more suggestion along this line, your garden would not be complete without a bed of pansies and verbenas. Two years ago, when I was on the mountain, I saw a bed of pansies there, which excelled in beauty any I had ever seen. It was about eight feet square, and was one mass of bloom. My trouble had always been to keep the plants from matting together and destroying each other, but this bed was covered with chicken wire about four inches from the ground, and the plants had run up through the meshes of the wire, and were thus held in their places. I made some inquiries and found that the bed had been prepared and the seed sown in the usual way, so I concluded that the secret was the chicken wire.

There is nothing in which we engage that is all sunshine; we will find that we have enemies to fight, even in our flower garden and front dooryard, and those having the best material to fight with are the surest and sooner the victors. This brings us to the second part of our talk, viz.:

SALT, SOAP-SUDS AND TURPENTINE.

Few farmers realize the value of salt on their farms. Sow your fields with salt and the cut worm will not destroy your corn, nor the grub worm your potatoes. Make your cabbage patch look as if a skiff of snow had fallen on it, a few days before you plant your cabbage, and you will not be troubled with club-root nor cabbage maggot.

Let the flower bed I have spoken of be well salted very early in the spring, and it will destroy germs of many insects that prey upon the foliage later. Dig around the roots of your trees and shrubs, and salt the ground well, and you will leave no place for the enemies that lie there ready to take the life of your plant as soon as an opportune time arrives.

Buy salt, buy it in large quantities; use it on your fields, in your garden, on your meadows and orchards, and you will find it the cheapest and best fertilizer you can get, and it will rid you of many of the numerous pests that prey upon your crops.

Soap suds will do more for growing plants than many of the costly fertilizers, and not one bucketful of it should be wasted, if you have a delicate tree, throw the suds from the laundry around it, and you will be surprised to see how soon it will take on new life.

My main object in bringing this matter to your notice to-night is for the purpose of making an earnest appeal for our orchards. Our dealers ask us 50 cents a peck for apples, and when we complain, they say: "Oh, but they are New York apples, or Michigan apples." Why

not Fayette county apples? Give your orchards the same care and attention you give your wheat fields and you will have more money.

I know a Fayette county farmer that made two or three trips a week to Uniontown and vicinity last fall, for three months; his average load brought him \$12.00. His orchard covered about five acres, and he told me he cleared some \$300. Where is the man in the county that cleared \$300 on five acres of wheat? Give your orchards a chance and they will pay you well. Keep the ground clear of insects by using plenty of salt. Make a kettle of concentrated lye soap, take a strong solution of this, mixed with turpentine, in the proportion of one pint to five gallons, and wash your trees well, twice during the season, once in the early spring and once in the summer, scraping away all the old bark, dig around the root and pour in from one to two gallons of boiling lye, mixed with one gill of turpentine, and one pint of salt well dissolved.

The greatest enemy to our orchards is the borer. It takes this insect three years to develop, and no orchard treated as above will be annoyed by this pest. We paid at the rate of \$4.00 per bushel for plums last fall and plums at that price is certainly better than corn at 50 cents. Dig around your plum trees, cover the ground early in the spring with salt; wash the trunk of the trees as above described, cut away all the knot, apply the turpentine, salt and soap, and during the blooming season spray the trees two or three times with a mixture of one-half pint of turpentine to a gallon of lime water, and your crop of plums is a certain quantity.

The quince is a native of the salt marshes; give it plenty of salt, with a scrubbing of salt, soapsuds and turpentine, and you can buy your wife a new silk dress every year with the money realized from the fruit of a few quince bushes.

A few years ago I had a dwarf pear orchard of about 50 trees, I was like other people, I was letting my trees alone and scolding because I got no fruit, until some one suggested that I give my trees some attention. I went to work with the treatment as above described, my trees took on new vigor, and the next year I had pears to eat and pears to sell. I kept this up year after year. My trees grew vigorously and my income from them increased proportionately to the amount of care and attention I gave them.

In conclusion, make your home the most beautiful place on earth. You can go there when you can go nowhere else. Spend a few dollars every year in some permanent decoration. There is no smoke nor dusty air to mar your work as soon as it is finished. Make the front yard attractive, decorate the porches and trellises with some of nature's beauties, use such means as come to hand, to make the trees, the grass, the flowers the best that can be produced.

Farm life is indeed a busy life, and it has a tendency to make some neglect the home life, but we should remember that the same diligent

care should be used on the immediate house surroundings that we are prone to lavish on our stock, and on our crops in far away fields. Make your homes attractive that when your children come to leave them they may feel like exclaiming with the poet:

"Must I leave thee? thus leave
Thee, native soil? These happy walks and shades.
Fit haunt of gods, where I had hoped to spend,
Quiet, though sad, the respite of that day
That must be mortal to us both? Oh flowers,
That never will in other climates grow,
My early visitation and my last
At even, which I bred up with tender hand
From the first opening bud, and gave ye names,
Who now shall rear you to the sun, or rank
Your tribes, and water from the ambrosial fount?
Thee lastly, nuptial bower, by me adorned
With what to sight or smell was sweet—from thee
How shall I part? and wither wander down
Into the lower world, to this obscure
And wild, how shall we breathe in other air
Less pure, accustomed to immortal fruits?"

MISINTERPRETATION OF TERM FARMER.

BY KATE LOUISE TREXLER. *Blandon, Pa.*

READ AT BLANDON INSTITUTE, BERKS CO., FEB. 15, 1901.

Farming is an occupation of men, that involves the tillage of the soil to such an extent that all the crops which are necessary to the sustenance of men and beast can be raised. The man that devotes his time to the cultivation of these products receives the name farmer, which is derived from the term of the occupation.

Farmers, like all men of different occupations, are divided into two great classes. Some of the farmers spend all their time in order to raise the best crops, and are always ready to try new methods which may have better results, hence they may be called progressive and energetic, while the others who are negligent can be called non-progressive. The latter do not work for improvement, they rather work to live. Since most of the non-progressive farmers are indolent, many of the people whose occupation is not farming are under the impression that only poor, indolent and ignorant people follow that occupation. Before they draw their conclusion, they do not think that such men are found in all parts of the world, and at all the different occupations. They think that all farmers are ignorant and that nobody else but them is wise.

City people usually belong to that class that think farming is rather a degrading occupation, and that any other occupation, no matter what it might be is superior to it. They do not think at that time that the farmers are the only men that afford them subsistence. If it were not for the farmer there would be very few independent people. If farmers would discontinue to raise more grains and fruits than what they need, the tables would be turned and the farmer would be the independent one, while the city people ignorant in that certain occupation, would be making a rude display of themselves in trying to raise what little they are compelled to have.

If there were no farmers there would be very little employment of any kind. All the different kinds of factories, especially shoe factories and carpet factories are supported directly by the aid of the farmers. No mill could be in existence were it not for the energetic farmers. For instance, look at the flour mills of Minnesota. Where would they obtain the wheat they turn into flour, to afford employment to so many thousand hands, if it were not for the farmers who raise it and then ship it there? But how many of these factory people yet think they are so much better than the farmers. They do not realize that they soon would be out of employment if the farmers should only shut down their factories. So if everything would be taken in consideration it could easily be seen that the farmers are the people that should be held in the highest esteem.

There is a general idea prevailing in some communities that farmers are not as intelligent as other people. Some are just as intelligent and even more so than many, and others would be if their employment gave them the opportunities to take advantage of the same. Many of the farmers have not the time to spend in the development of the brain. Do not think that many have no education at all. They all are well educated, but mostly in the line of raising crops, which is doubly good.

John Parnell, a noted writer, says:

"It matters not what you do,
Make a nation or a shoe;
For he who does an honest thing,
In God's pure sight is ranked a king."

The farmers often neglect to give their children all the value of education. The parents need their children on the farm, and so at an early age compel them to quit going to school, and many of them never let their children finish the course in the public school. Years ago some of the farmers thought that their children needed no more of an education than what their parents received. That was a sad mistake, but the vague idea is fast dying out. When there is such

progress made in everything it is easily seen that an equal progress in the education of books is made. Therefore parents should not neglect to give their children such an education as can best be supported by their means. A few farmers are only guilty of the preceding crime. Many of the farmers go to the other extreme and give their children the best education that can be obtained.

A century ago most of the educated people were rich people, and the farmers stood a very poor chance in holding any public office. But now in this prosperous nation many, and the highest offices, are held by men that were once poor boys and the sons of farmers at that. It does not take rich men alone to make a nation, but industrious men that help to lift a nation such as are found among farmers.

Many of the rich men of this era neglect to obtain employment when they are young, because they think they have enough money to last them all their lives, and so they are during their youth tempted to such degrading gambling places, where as if they had had work when young they would never have found time to ruin themselves in such places.

True manhood and womanhood should be cultivated in youth, and if it is neglected in youth it coincides closely with the proverb "As the twig is bent the tree's inclined." If such young men are friends of those places in youth, when they have reached a riper age they will still be found laboring under the same cause. As a general thing many such men are found among city people, and a smaller number among farmers. On the other hand a farmer's son has all the employment necessary, and so finds no time to spend in saloons and places of different nature. When he attains old age he can then see how many were mislead.

In the first case we had a young man whose parents were very rich, and the conclusion was that too many of those men are ruined because they were not taught to depend on themselves. In the last case we saw that most of the young men of farmers are kept away from those ruining places by constant work.

In many cases a farmer's son makes greater progress than a rich merchant's son. Send two boys to an institution of learning, both being of the same age and having made the same averages in public school, but one being the son of a farmer, while the other is a rich merchant's son. It can then be readily seen which one makes most progress. The farmer knowing the value of money by having earned it with the sweat of his brow, will give his son very little money to be spent foolishly. The rich man having more money and having earned it chiefly by speculation will be likely to give his son several checks to be used at his liberty. Both boys enter the same class, the former with the intention of gaining knowledge, while the latter is thinking only of having a good time.

At the end of the first year which boy made most progress? Not the boy that had the checks and the good time, but the one that received no checks and knew why he was sent to school. The second year the two boys stand still farther apart in their studies and they keep on drifting away from each other. During the same time that the farmer's son is gaining his companion is losing, and when graduation day arrives the farmer will be found standing at the head of the class, while his partner may have been excused from class, and may be a wreck for life. If the rich man had instructed his son in early youth to depend upon himself rather than on money, he too might have turned out to be an industrious and useful young man.

If it would depend on the financial standing of men, this country would be governed by millionaires and very few farmers would get a chance to enjoy any public office. But since it depends on intellectual abilities, the farmers stand in equal rank.

What kind of men does this nation of ours need? It wants honest, reliable and industrious and intelligent men, such that can help to lift our country higher and higher, until it stands as the most enlightened country on the globe. We never had a Vanderbilt nor a Gould at the head of our nation, all because they value the love of money beyond anything else.

A farmer's life is despised by many people because it is thought that no happiness could exist without a large sum of money. Those people do not know that the truest happiness is often found among the poorest classes of people. Happiness can exist in the lowest class of life. The birds may be compared with the latter. How much can they call their own? Yet they are considered to illustrate the lowest and yet the happiest form of animal life.

The millionaires are not happy. They fear that they might lose some of their money, and so invest none because they might be minus a few dollars at the end of the speculation. They give nothing to the poor and never try to help along a good cause. What man is more happy than the one who tries to make some one else happy?

The term farmer, too often is used as a term of slang. When a person, no matter what his occupation may be, is rather slow or awkward, the term farmer will be applied to him. That is to show that all farmers were distinguished from other people by those qualities. The expression "Oh, he is a farmer," which is so common among our city people, should be strictly abandoned. The farmers are less guilty of that crime than many others are. The farmers even if they are called slow have often obtained such positions of which very few are held by city people.

Longfellow says:

"The heights by great men reached and kept,
Were not attained by sudden flight;
But they while their companions slept,
Were toiling upward in the night."

During the last century the farmers have made decided progress. One hundred years ago many of the crops that are raised now were not raised then. Flax was then one of the chief products, while less potatoes and wheat were raised. The reverse is now the case. A large crop of wheat and potatoes are raised while little or no flax is raised. A hundred years ago the farmer raised only the crops their forefathers had raised, because they knew those would yield with success. They feared to experiment on raising other crops then, but now when farmers have all the advantages, such as printing presses, which give forth to all farmers alike, journals which pertain to successful agriculture, they can afford to spend some time in experimenting to see which crops will produce the best results.

Our forefathers had neither the advantages to become acquainted with their neighboring farmers. Very few farmers knew more people than those that lived within a radius of five miles. So in this case it is illustrated that "Farmers' Institutes" are of an indefinite value.

SANITATION IN THE HOME.

BY LAURA C. PIERCE. *Ambrose, Pa.*

READ AT AMBROSE INSTITUTE, INDIANA CO., DEC. 6, 1900.

Human life is a talent, a privilege, a probation. It is the choicest gift in the bounty of Heaven committed to our wise and diligent keeping. "Life is real, life is earnest," should be the motto of every individual.

Nothing is sadder than to see an aged person reflecting over a mis-spent life. "Oh!" he cries, "if I could only go back and live those days over again." But this he cannot do. He realizes that it is too late. His many opportunities are past and gone. Regrets are of no avail. And, as we watch him, truly, we see a picture of dejection.

Then in view of the very great consequences of life itself, is it not a question of vital importance how we live? What sanitary measures are adopted to preserve life in its highest and healthiest forms? It is in the home that sanitation should begin, whether it be in city, town or country. Lay a foundation for health and always build on

that foundation. Emerson says, "Health is the first wealth." Without health, what enjoyment has life? "Sickness is poor-spirited, and cannot serve anyone. It must husband its resources to live. But health or fullness answers its own ends, and has to spare, runs over and inundates the neighborhoods and creeks of its own necessities." Therefore, health is a duty, not only to ourselves, but to all mankind. It is one thing to have health, but it is another very different thing to keep it. Has God, or has he not given our health and our life, in large measure, to our own keeping? Is it according to his eternal purpose that babies and young men and maidens shall die, or that they shall do the world's work, and go down to the grave, like a shock of corn in its season, fully ripe? Does He intend that we shall violate the laws of our being, either through ignorance or carelessness, and then resign ourselves piously to the dispensation of Providence? Is it a dispensation of Providence? Is it not rather a dispensation of improvidence? Some physical law has been violated, hence, we must pay the penalty.

But what are some of these physical laws? Here they are summed up in three words—temperance, cleanliness and industry. This is the hygiene of the Bible. A "pathy" as old as the race. No sanitary system is complete without it.

It is applicable to all climes, and to all constitutions; it is always safe, always efficient; and to which not one radically new idea has been added in a space of 5000 years.

In speaking of temperance, we do not mean temperance in regard to the liquor habit only, which habit is the most terrible enemy man can encounter, but we must be temperate in all our ways of living. Intemperance in eating and drinking, intemperance in our social life, all these tend to undermine the health and lay the foundation for various diseases.

In order to build up every constituent of the body and to give strength, we need a great variety of food, and kind Nature has furnished this variety in great abundance of material. This material, after undergoing the necessary preparation, is brought to the table ready to be served. Now is the important step. If our food would do us the good that it is intended to do, we must eat slowly, masticating thoroughly each bite. But how many of us obey this injunction? Do we not far oftener hurry through the meal as if there was not a moment to lose, and sooner or later we are suffering from indigestion or dyspepsia. Aside from rapid eating, all cares, worries, or anything unpleasant or disagreeable should be avoided. The meal-time should be a joyous occasion. A cheerful face and light heart are friends to long life, and nowhere can they serve us better than at the table. In fact, cheerful conversation will, in a measure, prevent rapid eating.

Besides proper food, the body needs exercise. Bodily activity and bodily health are inseparable. Exercise is healthful, because the more we exercise the faster we breathe; the faster we breathe the more air we take into the lungs; as it is the life-giving oxygen we breathe that purifies the blood, so the more air we take in, the more perfectly is that process performed. Hence the purer the blood the better our health must be. Violent exercise, or exercise long-continued, must be avoided, since it tears down faster than nature can build up. Feats of strength are not only injurious, but often prove fatal. It is very dangerous to try to outdo one's companions whether at work or at play. We should be guided by the injunction of Isocrates, the Greek rhetorician, who, 2000 years ago, said, "Exercise for health and not for strength."

After exercising or working the body is tired and demands rest. It is as important to rest at the right time as it is to exercise. How many a tired housewife would find sweet relief, if she would only take time to rest! But she thinks this is impossible, she has a thousand and one little things to do which are so trying to the patience. If the average man would for one week exchange places with his wife, and engage in all the occupations of the day—the mending, the making, the contriving, the caring for babies, tying up cut fingers, binding up burns and bruises, preparing three meals a day, clearing away the dishes, sweeping, dusting, to say nothing of the washing and ironing, baking, milking, churning, and many other things which are to be done about the farmhouse. He would realize the truth of the old adage:

"Man works from sun to sun,
But woman's work is never done."

And he would understand far better after such experience, that it is this constant repetition, the drop by drop, inch by inch of woman's work that wears her out. He would also realize the need of more labor-saving appliances, one of which is most necessary—hot and cold water. How very much the work is lightened, when water can be supplied by turning the spigot, instead of carrying from the spring or wagging the pump handle.

All these appliances cost but a few extra dollars. Why should not the farmer's wives have them as well as their town neighbors who have so much less work to do. This is a farmer's institute and we speak in defense of our country homes. Why is it that so many people wish to go to town? True, there are educational advantages in town which we do not have in the country, but the country can boast of advantages which town and city cannot—good, pure air, fresh water and food, so necessary to health. These are not always to be had in our towns, and especially is this true in our cities.

Think of the poor, ragged little urchins in the tenements, who live mostly in the filthy streets. How surprised and delighted they are, when some of them are for the first time brought to the country for fresh air! They have been known to ask if this is not Heaven. No wonder they ask so startling a question. They have never seen the green fields and woods, much less have they run about in them, listening to the singing of the birds and gathering the sweet-scented flowers from hill or vale. It is to them a golden opportunity, and it is a sad day when the time comes for them to leave the beautiful country and go back to their old haunts in the city—the place they know as their home.

Another sanitary law is cleanliness. Cleanliness is to the body what education is to the mind. The beauties of one as well as the other, are blemished if not totally lost, by neglect. Cleanliness of the body promotes health. The pores of the skin must be kept open to admit air into the body and to allow the waste matter in the form of perspiration to pass out. Serious results occur if these pores are allowed to clog.

But while cleanliness of the body is necessary to health, so is cleanliness in the home, in the cellar, and the surroundings of equal importance. Many disease germs originate from decayed vegetable matter or impure water, which are in some way transmitted to the human system. An ounce of prevention is worth a pound of cure. Prevent the disease and there will be no need of cures. Hundreds of people die every year from causes which might have been easily prevented.

Formally, the plague swept like a destroying flood over Europe about once in ten years, and men bowed their heads and said, "It is a visitation of God." They looked upon it as a "necessary evil." But wiser men inaugurated street cleaning and public sanitation and as a result the plague almost wholly disappeared from the world, and the average length of life was increased two years.

Cuba, since becoming a possession of the United States, has a system of sanitation which has greatly lessened the ravages of yellow fever, which was so prevalent in the island while under Spanish rule.

Cholera, which is simply the penalty of filthy streets, bad drainage, etc., may be controlled or entirely prevented by suitable sanitary measures.

And we might add many other instances, but it is not necessary, as all have the same result in common—A proper observance of all the laws of health.

It is well to know these things, but happy are we if we do them.

EVENINGS IN THE COUNTRY HOME.

BY MISS BERTHA A. KEARNS, *Thompsonstown, Juniata County, Pa.*

America is pre-eminently the land of universal education, the land where the son of the humblest citizen has a chance to win his way to an equal footing with the favored son of fortune. This is not so in all parts of the world, for we know that in some countries only the nobility have freedom to rank and the poor are classed in lower castes and kept as servants. There are many classes of people in our country, but our laws give equal rights to all. The farmers are the class we represent and we know they have played an important part in the formation of our government.

This time of the year the country seems dull to many. But nature is doing her work and now beneath the beautiful robe of snow lies countless germs of life only waiting for the awakening of springtime.

How to spend the long winter evenings in the rural home, is an interesting problem to the young and old of many country homes.

Years ago, when this country was thinly settled, and cities were unknown, people were contented to sit by the fireside and tell of the day's sport in the forest. But the great rush of fashion, customs, amusements, etc., has revolutionized the homes of our land. The country home is for the most part shut out from all those means of instruction and entertainment to which the inmates of the city home have access. There are no lecture courses or musical concerts in the country to amuse and entertain the young. The occasional lecture or the concert, or cantata at the church, or perhaps the country spelling school or the debating society at the cross roads school house may now and then claim the attention of the young men and women of our country homes, hungry for entertainment and thirsty for knowledge. But these do not solve the problem of the profitable way of spending the long winter evenings in the rural home. Our fathers and mothers tell us how secluded were the average country homes forty or fifty years ago, and in many respects they are secluded still.

The great truth is that now as then the country home for most part must find the solution of this difficult problem from within and not from without. The home is the heart of real life. The school boy is a cadet in the military academy. His conflicts are in the far future. His fields of strife are in the imagination. But his father and mother are in the heat and battle of home life. The home discipline determines the destiny of our land.

Dr. Sheldon emphasizes the value of true home life. He tells of his country home where he spent the early part of his life. His parents with a large family had a small house—two rooms—one upstairs and one down stairs. The downstairs was divided by imaginary lines into three apartments, kitchen in one end, dining room in the center and parlor at the other end. After the day's work was done on the farm the father and mother with all their children would gather in the parlor and enjoy the evening; the parents reading, telling interesting stories and amusing the children in a proper way. Dr. Sheldon then spoke of his work, saying after his church work he belonged to his home. Home is where true manhood and true womanhood are needed.

We know that members of a family have their appointed work and cannot be together at all times, but if there is one time in a day they can be together it is in the evening. We would like to have the attention of every boy and every girl in all country homes and tell them they are supremely blessed because they have these evenings before them, and that they should know how important it is that they spend them profitably. The long winter evenings, when all the tasks of the barn and household are done, give opportunity in the country home to improve and instruct the mind as can be found nowhere else. The larger the family circle, the more profitable and enjoyable can the evening be made.

Could we but stand on a high tower, and with the aid of a glass look into all the homes of this State, in one evening we would have a good knowledge of the social family life of each home. What would be said of the city homes compared with the country homes? Would we glance into one city home and find all the members of the family together? Some fathers and mothers would be home, children all scattered, some at the fashionable opera play that just came to the city, some at a show given by a traveling troupe, one boy enjoying a trifling street amusement, perhaps another son has been allured by some low, debasing place, always open to the one easily influenced.

Another family: Mother is a member of an Order and is out attending a meeting; father is at his place of business, will not be home until late; children are kept by a governess and put to bed. No father and mother to care for them and show the proper parental love. It is true that many fathers go out early in the morning, come home late at night, and do not see their children awake during the week days. One Sunday morning one of the children said: "Maamma who is that strange man that stays here on Sunday?"

Another home is very gloomy. The father is a great mathematician and has no time for home consideration. He never unbends. The mother's rheumatism hurts so she does not see how little Maggie

can ever laugh. Childish curiosity is denounced as impertinence. The parlor is a parliament, and everything is in everlasting order. Balls and tops in that home are a nuisance and the pap that the boy is expected most to relish is geometry sweetened a little with the chalk of blackboards. For cheerful reading the father would recommend "Young's Night Thoughts," and "Hervey's Meditations Among the Tombs." At the first chance the boy will break loose. With one grand leap he will clear the catechisms. He will be so glad to get out of Egypt that he will jump into the Red Sea. Restraints are necessary, but there must be some outlet. Too high a dam will overflow its banks and inundate all the meadows.

Do people of the cities realize what it means to have a family of boys and girls growing up with so many dangers surrounding them? Saloon next door, gambling room across the way, and evening amusements to take all the money they can get.

City people come to the country and say: "I could not live here, there is nothing to see, nothing to hear, the evenings are so long and quiet." One girl says, "I could stay in the country during the day, but not in the evening, it is too dull then." What do such people lack? They lack an important part of practical education. They have not the idea of true life. We are not made to sit at a city window and gaze at passing sights and listen to the pleasing sounds. We are to be up and doing. Actors in this great drama of life and not empty vessels to make the noise.

What can we say of the country home? Pleasure and the pursuit of it are not the first things inculcated in the young minds of American farming people.

Pleasure comes after duty has been done, and it is the reward for duties that have been well done. This placing of duty first is the great disciplinary advantage in the training our country boys and girls receive. The farm work cannot be postponed. The accomplishment of it becomes a habit for life. Nearly everything a country boy or girl encounters day by day has a tendency toward the development of a healthy and wholesome individuality. The boy's work, mostly out of doors, inculcates industrious and regular habits, while it contributes to a physical development which in later years is just as valuable as any athletic training that can be had. The girl gets exercise in various works as beneficial as the famous del-sarte drills.

After the day's work on the farm, after the school hours, the members of the family with glad hearts gather around the fireside. How good the supper kind mother has prepared! Girls then tidy the table and do away the dishes. The family is next ushered into the warm sitting room where the evening is spent. Perhaps some game is played in which all can take part, occasionally music and singing.

Then the books are to be studied by the school children. The grown young people enjoy a book of literature, travel, history or adventure. Books are numerous and can easily be obtained, but we must make a good choice. We may journey to the ends of the earth with travelers the most observing the world has produced. Or suppose science. This subject has been made easy by books and can be studied by any one at home. The courses of study sent out by the State College afford good instruction for the country student. The course of nature study cannot be overestimated. Do we know what knowledge has been learned by the evening fireside in past centuries?

Our grand and good statesmen and patriots so noted in our nation's history, worked hard during the day and at night would be delighted to read some book on science or history. They eagerly perused their books late at night. They were not hurried off to college to receive from the professors every light and explanation on the sciences. But by hard study and brain work they acquired the grand principles which governed their lives and our country.

"It is from the farm and the country districts that the great brain power of the country has come, is coming to-day, and must come in the future," wrote Edward Bok, in the *Ladies' Home Journal*. "Instead of deprecating country life, and saying that 'to live in the country means to live out of the world,' intelligent people know that the free, untrammelled life of the country unquestionably gives broader views. The human mind always grows to suit its outward surroundings. Originality and a development for great things has naught to check its growth where one can look with earnest eyes from nature up to Nature's God. To speak of 'the ignorance of the rural regions' is to stamp one's self as an ignoramus, not the country people.

"There is a soundness of core and an intelligence in the back country of this nation of ours that people who live in cities and think themselves wise never suspect. We can talk all we like of 'social revolutions' and kindred evils that are supposed to threaten our nation. When they do threaten our institutions the danger-signal will not come from the back country. Such thoughts are born and fed amid the foul atmosphere of the cities. In the clear country air of the farm, nothing threatens this country, and when anything in the shape of anarchistic or socialistic revolution does menace this land the true voice which will stamp it out will come from the country. The backbone of this land rests in the country and on the farm."

OUR COUNTRY HOMES—THE STRONGHOLD OF OUR STATE AND NATION.

BY ISAAC ZIMMERMAN. *Richfield, Juniata County, Pa.*

Madam de Stael calls beautiful architecture "frozen music." And in traveling over our country we notice in many of our villages and rural districts an improvement in buildings over those of former days; but it is not of the architectural part of our homes that I wish to speak this evening, except incidentally; for

"'Tis not the casket that we prize,
But that which in the casket lies."

Every true home is a poem, whose music finds lodgment in the hearts of its inmates, and expression in beautiful deeds and noble lives. A building may be surrounded by beautiful laws and picturesque scenery; may contain expensive material and symmetrical proportions; spacious hallways and commodious rooms; luxurious furniture and costly musical instruments; large libraries and beautiful pictures; yet with all these externals, unless charity and mutual forbearance, kind natures and loving hearts dwell there, it will lack many of the true elements of a home.

"Home is where the heart is,
In building large or small;
And there's many a splendid palace,
That's never a home at all."

As a rule, not from our public thoroughfares and palatial residences, but from the more secluded parts of our country, from homes of humbler pretensions and often from log-cabins, come the men who made American history resplendent with great achievements and heroic deeds. From the "slashes" of the South came Henry Clay, whose brilliant career and eminent services have enshrined his memory in the hearts of grateful millions. From the hills of New Hampshire came Daniel Webster, whose resistless logic "groned to powder" the advocates of state sovereignty and secession, while his genius frequently forged and hurled oratorical thunderbolts which electrified the nation and reverberated through the universe. From the "wilderness" of Ohio came James A. Garfield, whose statesmanship, forensic oratory and thoughtful and instructive eloquence have blazoned his name high on the roll of our country's celebrities; while from an Ohio village and from the banks of the blue Potomac, came

Grant and Washington, immortal worthies, whose superlative military leadership is inseparably associated with two of the greatest and most beneficial causes in human history.

Thus we might multiply almost infinitely examples of country boys who won the highest measure of distinction along the various lines of human effort. Most of our successful business men in our great cities to day came from rural or village homes. Several years ago I read in a New York City paper, a statement that of all the editors of the great newspapers of that metropolis, only one was born and reared in the city. And what is true of New York, is largely true of other cities, not only along editorial, but also along other business lines. In the country a boy gains almost without any conscious effort a vast amount of useful knowledge about nature and other things concerning which his city competitor remains ignorant, or acquires only at the expense of much time and hard study. Country life and labor are conducive to health and the development of a robust constitution, better adapted to stand the strain it may be called on to endure in subsequent life.

Development of pluck is another result of life on a farm. A boy is often placed in a position of trust or responsibility, when unexpected emergencies arise requiring him to depend on his own resources, and surmounting the difficulties, it creates within him a spirit of self-reliance and courage to fight the battle of life manfully and heroically.

The weal or woe of a nation depends largely on the home life of its people. In order that our homes may be the stronghold of our State and nation, proper influences and healthful conditions must exist within them. Strict obedience should be required. In homes where children are allowed to be insubordinate, and to lord it over parents, they generally grow up to be selfish and domineering, without respect for authority of any kind, while frequently some from this class have to be taught restraint by the strong arm of the law; while from those homes in which obedience and respect for the rights of others are taught, will likely come a fairer-minded and better class of citizens. It is generally conceded that only those will ever be fit to command who have first learned to obey. Both sexes should be taught to work. Every one should be able to do some kind of useful labor and to do it well.

Some parents require this on the part of the boys, but neglect the girls. The poet says:

"To spin, to weave, to knit, to sew,
Were once a girl's enjoyment;
But now to dress and catch a beau,
Are all a girl's employment."

The condition described in the last two lines is prevalent in too many of our homes to-day. Mothers wear themselves out in doing all the drudgery and work of the home, while daughters are allowed to gad about, or to loiter in idleness and fine clothes, frequently the parlor, probably playing the organ or piano, to lighten the labor of the mother slaving in the kitchen. I do not decry music. A knowledge of it is a desirable accomplishment; but the girls of to-day will not all become "old maids," nor will all marry rich men. Most of them will become wives, and the mothers of a future generation; hence they should also be taught to do all kinds of household work, so that when called on to preside over a home, they will be able to administer affairs properly and economically. Do not imbue them with the false idea that kitchen work is degrading; but teach them that all honest labor is honorable. Boys, as well as girls, should spend most of their evenings at home. Parents should provide some recreations and amusements that will be entertaining and instructive, and aim to make home as pleasant a place as possible.

In many of our homes where no provision is made, and where there are neither books nor newspapers, when evening comes, boys go to the nearest village, frequent hotels and shops where cigarette smoking, profanity and all kinds of lewd talk are indulged in, and by association, acquiring the same habits. It is the duty of parents to counteract these influences and inclinations. Every home should have suitable literature, only that being allowed to enter which is pure and elevating. I consider the *Youth's Companion* one of the very best papers for the young that can enter any home, and if used in the way suggested by Miss Hunt in her excellent essay last night, will redound to the advantage of all. There are also many of the juvenile classics, excellent books for boys and girls, and so cheap that by the exercise of a little economy in a few other directions, they need not be excluded from any home. I would recommend poetry, history and biography. "Weem's Life of Washington" influenced Lincoln to start on his useful career, and so filled him with patriotism, that when elevated to the presidency during the most turbulent period in our history, full of faith and courage, he seized the helm and steered the ship of State through the breakers of civil war to a peaceful harbor, while the foulest stain on our national escutcheon was being washed away in human blood, and a higher civilization inaugurated. And many a boy while reading the sublime story of a great and noble life may receive inspiration which will lead him to accomplish something that will link his name with those of the world's benefactors.

Intellectual development should not be neglected. In a nation like ours, where great public questions are constantly presenting themselves, and where the masses have a voice in their solution, every one should have the requisite intelligence and the firmness to

decide, without any dictation from bosses or demagogues, what will have a salutary influence on our country. Every home should be a nursery of patriotism. In peace the country needs men, as well as in war; men who will not bow to all the mandates of the politician; who are not patriots simply for the sake of political preferment; but who are true to their convictions of right, though their course be unpopular and compel them to sacrifice personal or political prestige. These are patriots of the highest type, and as real heroes as those who proved their valor on the field of battle, amid the boom of cannon and the clash of arms; and I heartily endorse the sentiment recently expressed by a southern orator, that one true, devoted mother can instil more real patriotism than a dozen loud-mouthed men. A moral atmosphere should pervade every home. Instruction of this kind should be regarded as of paramount importance, since morality ennobles individuals and exalts nations. The moral training in a majority of our homes is intrusted mainly to the mothers; and many are laboring zealously and are achieving excellent results in the development of grand and noble characters.

Some years ago the question "What does the country need most?" was asked in England. Her statesmen pondered over it and referred it to the throne; and from the sovereign, who had herself been a model along that line, came the answer "More good mothers." Many of our eminent men paid the most glowing tributes to their mothers for the influence they exerted on their lives. When Jackson was complimented for not being afraid to say and do what he believed to be right, he replied, "That I learned from my good old mother." Lincoln said, "All that I am or ever hope to be, I owe to my mother." While the kiss which Garfield gave his wife and mother just before reading his inaugural was an acknowledgment before the assembled thousands how much he was indebted to those two estimable women for the honor conferred upon him. And I venture to affirm here this evening, without the least possible fear of successful contradiction, that that mother who gathers her children around her knee, teaches them to lisp the infant prayer, and implants the principles of piety, noble manhood and virtuous womanhood and the germs of good and useful citizenship, is more entitled to the plaudits of the world and the gratitude of the country and posterity than most of the warriors who waded to power and renown through rivers of blood and the tears of thousands of widows and orphans. "The hand that rocks the cradle is the hand that rules the world." Boys and girls cannot always be kept away from temptation, but I believe that through judicious training it is possible, in a majority of cases, so to fortify them that when the waves of temptation roll against them they will recoil like the ocean's billows when they dash against some bold headland.

And if as a nation we wish to perpetuate our liberties, the incultation of moral principle dare not be disregarded.

Edward Everett says: "For moral desolation there is no reviving spring. Let the moral and republican principles of our country be abandoned; let impudence and corruption and intrigue triumph over honesty and intellect, and our liberties and strength will depart forever. Of these there can be no resuscitation. The 'abomination of desolation' will be fixed and perpetual; and, as the mighty fabric of our glory totters into ruins the nations of the earth will mock us in our overthrow, like the powers of darkness, when the throned one of Babylon became even as themselves, and the 'glory of the Chaldees' excellency had gone down forever." Similar sentiments are voiced by all our great orators and historians.

And any one conversant with history knows that national greatness always followed a period of great intellectual and moral vigor; while a prolonged epoch of moral decadence always resulted in the downfall of dynasties. If we were to-day to visit the countries once occupied by the most powerful nations of antiquity, they would remind us of some of our country graveyards, where a few monuments rise above a wilderness of weeds and briars. We should behold the pyramids and a few other structures towering above the general desolation as monuments to the genius and civilization of the ancestors of the present craven inhabitants; and amid all the ruin and depravity we should be taught, with mute but impressive eloquence, the sad lesson that unless we as a nation would share a similar fate, we must emulate their virtues, but avoid their vices.

A spirit of justice and uprightness should characterize our course at home and our relations abroad. Powerful armaments will be of no permanent avail unless a righteous cause be behind our guns; while impregnable fortifications, material greatness and all our internal improvements will not save us from ultimate dismemberment or ruin, if we indulge in a career of injustice or internal corruption. Our safety will rest in the improvement of the minds and hearts of our people. Bishop Whipple, one of our most accomplished rhetoricians, says:

"The true glory of a nation is in an intelligent, honest, industrious, Christian people. The civilization of a people depends on their individual character; and a constitution which is not the outgrowth of this character is not worth the parchment on which it is written."

You look in vain in the past for a single instance where the people have preserved their liberties after their individual character was lost. The ruler may gather around him the treasures of the world amid a brutalized people; the senate chamber may retain its faultless proportions long after the voice of patriotism is hushed within

its walls; the monumental marble may commemorate a glory which has forever departed. Art and letters may bring no lesson to a people whose heart is dead. The busy click of machinery, the merry ring of the anvil, the lowing of peaceful herds, and the song of the harvest home, are sweeter music than paeans of departed glory, or songs of triumph in war. The vine-clad cottage of the hillside, the cabin of the woodsman, and the rural home of the farmer, are the true citadels of any country. There is a dignity in honest toil, which belongs not to the display of wealth or the luxury of fashion. The man who drives the plow, or swings his axe in the forest, or with cunning fingers plies the tools of his craft, is as truly the servant of his country as the statesman in the Senate or the soldier in battle.

The safety of a nation depends not alone on the wisdom of its statesmen or the bravery of its generals. The tongue of eloquence never saved a nation tottering to its fall; the sword of a warrior never stayed its destruction. There is a surer defense in every Christian home. I know of no right wrung from tyranny, no truth rescued from darkness and bigotry, which has not waited on a Christian civilization.

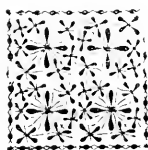
Would you see the true image of glory, I would show you villages where the crown and glory of the people is in Christian schools, where the voice of prayer goes heavenward, where the people have that most priceless gift, faith in God. With this as the basis, and leavened as it will be with brotherly love, there will be no danger in grappling with any evils which exist in our midst; we shall feel that we may work and bide our time and die, knowing that God will bring victory."

Therefore, may the home environment throughout our land be such as will develop in the coming generations industrious and temperate habits; a love of knowledge, truth and justice; lofty patriotism, noble aims and grand Christian characters. Then with such an equipment, we can send them forth on life's journey, confident that they will carry the home virtues to every avenue of our social, industrial and political structure, and through them our country will continue to rank as the brightest star in the galaxy of nations, her brilliant and beneficent rays lighting and guiding the more benighted lands to a higher, purer, nobler national life, and spreading a Christian civilization around the globe.

PAPERS SELECTED FROM THOSE READ

AT THE

Annual Meeting of Farmers' Institute Managers.



PAPERS SELECTED FROM THOSE READ AT
THE ANNUAL MEETING OF FARMERS'
INSTITUTE MANAGERS.

A BALANCED RATION FOR PLANTS; HOW TO GET IT.

BY PROF. L. A. CLINTON, *Ithaca, N. Y.*

By a "balanced ration for plants," we mean the presence in the soil, in the available form and in the proper proportions, of the various soil-derived elements necessary for the growth of plants and for the development of fruit and seed. Fortunately for the tiller of the soil, nature has made a wise and liberal provision for plant food, and in all our arable lands there are usually found in abundance the various plant foods required. We find, however, that as the soil is subjected to cultivation, and as plants are grown and removed from the soil, they draw unequally upon the mineral elements stored, and ultimately there is a deficiency of some one or more elements, or while there may not be any deficiency in the total amount present, yet the plant food is not available, and some measures must be taken to balance up the ration again.

The soil is a part of nature's great chemical laboratory, and if the work is left to nature she will do her work well, though she may take thousands of years in which to do it. We cannot wait for nature to perform the work alone, but we may co-operate with her in hastening the processes which are going on in our soils, and we may even draw from nature's special laboratories, where she has made a business of manufacturing phosphates or nitrates or salts of potash. Whether, then, we assist in the work by tillage or by the use of commercial fertilizers, we are simply co-operating with nature.

"Man does not live by bread alone," is an expression the truth of which we all recognize. The term "a balanced ration" has become familiar to all as applied to animals, but we have not come to recognize its meaning generally when applied to plants.

The most careless feeder of animals now recognizes the fact that in order to produce best results there must be a certain relation between the various elements of food supplied, this relation varying somewhat according to the conditions and according to the product desired, whether that product be energy, or milk, or flesh. This relation or ratio, may vary within certain limits without materially

affecting the amount or quality of the product. But the variation cannot go beyond certain limits without in some way affecting the product. While in feeding plants the lines are not so definitely marked, yet certain it is that for best results some attention must be paid to the supply and availability of the soil derived elements likely to be deficient in the available form, viz: Nitrogen, phosphoric acid and potash.

As in feeding animals the proteids or nitrogen bearing constituents are the expensive parts of the ration, so in feeding plants, the nitrogen is the expensive element if it must be purchased in the market.

While we cannot say that any one of several necessary elements is more important than the others, yet in securing a balanced ration for plants the nitrogen usually demands the most attention. It is this element which is most easily lost from the soil. A superabundance of it in the soil may over-stimulate the vegetative system and produce a large growth of plant and foliage, but at the expense of fruit and grain. Too much nitrogen may also cause a growth which is lacking in hardiness and the plant is likely to become the victim of blight and disease. A deficiency of nitrogen, on the other hand, means the slow growth, lack of woody tissue and foliage, and lack of fruit and grain, because the factory or plant is deficient in capacity.

Nitrification or the changing of compounds containing nitrogen into the form of the nitrates, a form available for plants, takes place most rapidly when the soil temperature is from 90 to 100 degrees Fahrenheit. It will thus be seen that in the early spring when the soil is cold that plants may suffer from lack of nitrogen, when later in the season there may be an abundance of nitrogen made available through the process of nitrification. If it is desired to stimulate the growth of plants in the early spring, some quick acting form of nitrogen should be used, as the nitrate of soda. This is found to prove especially valuable when wheat or grass in meadow or pasture are slow in beginning growth in the spring. It would be folly in such cases to apply slow acting nitrogen because it could not be made use of before the temperature and soil conditions were favorable for nitrification and then no commercial nitrogen would be needed.

Where it is known that a certain soil is deficient in nitrogen and that plant growth is likely to be slow even during the periods when nitrification is most rapid, commercial nitrogen should be applied, a part of which is in the quick acting form, as nitrate of soda, and a part should be in slower acting forms, as dried blood, tankage, cottonseed meal, or other organic forms of nitrogen, all of which are somewhat slower in their action than is nitrate of soda. The bal-

anced ration so far as nitrogen is concerned, then, is obtained from the soil if possible without any application of fertilizer. If commercial nitrogen is used, a study of the conditions and the needs of the plant will cause one to decide what shall be the source of the nitrogen supplied. High grade, quick-acting nitrogen should be applied in a relatively small amounts, for the soil does not possess the power of fixing the nitrates that it does of fixing phosphoric acid and potash.

As the result of actual field experiments it is found that phosphoric acid is more often needed in balancing the ration for plants than is any other element of plant food. This is without doubt due in part, to the fact that phosphoric acid combines with many substances contained in soils as lime, iron, etc., and as a result of such combination the phosphoric acid is very effectually fixed by the soil. So firmly is it fixed in combination that it is often impossible for the plants to "unfix" or liberate it fast enough to supply their demands and hence plants may suffer for lack of this important element of their food, even though it be present in the soil in large quantities.

As a principle, it should be remembered that the phosphoric acid in a high grade fertilizer is never available in any larger per cent. at any one time than when it is applied to the soil, but that the tendency is constantly toward a reversion to forms which are less available.

There has in recent years been much discussion as to the relative value of soluble and insoluble phosphoric acid as plant food. The claim is made, and correctly made, that if soluble phosphoric acid is applied it soon becomes reverted and then insoluble. The value of any fertilizer depends, to a considerable extent, upon the even and thorough distribution of the fertilizer through the soil. The soluble phosphate is distributed in solution, and when it is finally "fixed" by the soil, it has been distributed evenly, and plant roots can come into intimate contact with the fertilizer.

It is not necessary in all cases to purchase high grade phosphate fertilizers. Under certain conditions insoluble phosphoric acid as contained in floats, crude ground rock, may prove beneficial. The conditions, however, under which such a fertilizer may be used to advantage should be well understood or failure of success will result. Insoluble phosphoric acid of the soil is rendered slowly available for plants use by means of the fermentation and decomposition of organic matter and by the action of plant roots in the soil. The process goes on most rapidly in those soils which are well supplied with humus, moisture and high temperatures. In using insoluble phosphoric acid as a fertilizer we fertilize the soil rather than the crop which is growing upon the soil; immediate results should not be expected, but there is some satisfaction in knowing that the total amount of phosphoric acid in the soil has rather been increased

than diminished. Insoluble phosphoric acid can best be made available by thorough tillage of the soil combined with the use of farm manures and with green manuring and cover crops. The wise practice, then, in using phosphate fertilizers of low grade of solubility, but high in per cent. of phosphoric acid total, is to apply them to some hardy, strong feeding cover crop, as rape or turnips, and always sowing with the cover crop some rye if it is expected to let the land remain unplowed during the winter.

We warn the farmer against the use to any considerable extent of insoluble phosphates. While it is true that the plant food may in time be made slowly available, yet the conditions most favorable for its use are not usually present. Moreover, the same conditions which will render the plant food in insoluble phosphate fertilizers available will also liberate phosphoric acid which is already contained in most soils in liberal quantities. We recommend as the wise practice the use of high grade phosphates for the purpose of feeding the immediate crop, and that the soil be made to give up some of its stores of plant food by means of thorough tillage and the use of cover crops and manures.

The potash required for general farm crops may at present be most economically secured from muriate of potash. This is a form of potash very acceptable to plants, uniform in composition, and may be used in all cases except for some special crops, as tobacco, where the sulphate seems best adapted. Those soils which are formed as the result of glacial drift seem to be well supplied with potash, and upon glacial drift soils intensive tillage apparently gives more marked results than it does upon those soils which are largely alluvial in character.

It has, in times past, been the dream of some experimenters, that they would be able in time to figure out a balanced ration for plants the same as we do now for animals. But this idea is now held by but few. Indeed field fertilizer experiments are not nearly so popular in experiment work as they formerly were. We cannot as the result of our experiments lay down any general rules, and say that corn should be fed in this way and wheat in that way, because there is always an unknown and uncertain element which enters in, viz., the soil.

To learn then just what constitutes a balanced ration for plants we must know the soil and its capabilities. Having determined this we are then prepared to proceed intelligently along certain lines. The science and art of feeding plants are not fixed and definite. He who would acquire a knowledge of the subject must study the plants as they grow and he must be so in touch with nature that he can understand the language of plants as the good feeder understands the language of animals.

We must make the soil the basis of plant growth, and make fertilizers simply the adjunct. We must learn to use the soil and not abuse it. By a rational use of commercial fertilizers, by husbanding the home sources of fertility, by a judicious use of cover crop on every possible occasion, these combined with thorough tillage will solve the problem of a balanced ration for plants.

RELATIVE VALUE OF FODDERS.

BY PROF. WELLS W. COOKE, *Washington, D. C.*

The subject is capable of several different treatments, of which two will be chosen. It will be treated first, from the standpoint of the relative value of foods for keeping the animal alive. When an animal is fed just enough to keep it in health, neither gaining nor losing in weight, performing no work and producing nothing for the service of man, it is said to be receiving a maintenance ration. Such a maintenance ration needs to supply three things. First, it needs to repair the slight waste of the body that is all the time taking place. Secondly, it needs to supply the muscular force used by the body in operating the lungs, keeping up the circulation of the blood and supplying the energy used in masticating and digesting the food and carrying it along through the alimentary canal. Every animal also uses some muscular force in the slight movements that are made, in getting up and down and in holding itself erect. Thirdly and lastly, the food must supply heat to take the place of that which is radiated from the body and is carried off in the sensible and insensible excretions.

The first of these needs is the most important in the sense that we have the least control over it. Under the conditions of maintenance the body does not waste very fast, but this waste must be supplied or the body loses in weight, and the food must also contain all of the different ingredients, i. e., materials for making bone, flesh and fluids. The amount required for the other two purposes can be somewhat regulated by man. The animal can be placed in a stable warm enough to lessen the requirements for heating the body, and by the use of concentrated food, the amount of force required in mastication and digestion can be largely reduced.

When the food furnished is less than maintenance, the order of use is first to keep up the heat of the body, because if the body cools but a little below normal, death ensues at once. At the same time,

and intimately connected with the formation of this heat, is the use of enough energy to keep the heart and lungs in action. Here is shown one of the greatest economies of nature. The body demands the use of a certain amount of energy to carry on the operations of life, but all this energy in fulfilling its office in the body is at the same time changed into heat and performs the double office of doing work and producing heat. Thus when the heart beats it is using up force, but at the same time all this force is changed into heat and helps to warm the body. Just as when one pounds a nail on an anvil the nail becomes hot from the force of the blow that is changed into heat.

Here also comes in one of the finest and most difficult of the problems yet to be solved in animal nutrition. If the body needs more heat than force, then all of the force so far as it is expended internally will be no loss to the body because it will furnish just as much heat after producing the force as it would if it had been burned at once for fuel. If, however, more force is used in the body, than is needed in its equivalent of heat, then all the extra heat is so much sheer loss. We know that when the body is working hard there is much more heat produced than the body needs. Then the body breaks out in a profuse perspiration to try and get rid of some extra heat.

There is also another way in which heat is produced in the body. Much of the digestion is in the nature of fermentation, and just as the materials in the soil heat when they begin fermenting, so all of these fermentations in the alimentary canal cause the giving off of considerable heat. If the body needs this heat, then the fermentation causes no loss, but if as is usually the case, the actual muscular energy used gives out all the heat necessary for the body, then all the material that is used up in the fermentation is just so much clear loss to the body. We do not know just how much of the heat of the body is really utilized, but in the absence of definite knowledge, the best we can do is to suppose that on a maintenance ration the food is used in the most economical way and there is no waste heat produced. We know that this supposition is not exactly correct, but in the present state of knowledge it is probably the best supposition that can be made.

On this basis it is quite easy to estimate the relative value of foods, because all we have to know is their total digestibility, and the kind of constituents that are digested.

One correction has to be made. When food is digested by a ruminant, part of the actual food value is actually destroyed and passed off as a gas. In the horse the same fermentation takes place in the large intestines. This much is all loss and must be subtracted from the value of the digested portion. As it is not possible to determine directly by actual measurement the amount of food value

gotten out of the food by the body, it is customary to calculate it indirectly. The total food value is ascertained of the food as it is taken into the body. From this is subtracted the value of the undigested parts of the food and the difference is taken to represent the amount of food value the body has obtained from the food. From this must next be subtracted the amount of food value that has been thrown off as gas, and the remainder is the net food value of the ration.

Thus, to take a concrete example: If a hundred pounds of whole corn is fed a steer, the animal will digest on the average about 78.8 pounds. Of this amount 4.3 pounds will be fat that has a food value per pound two and one-fourth times as great as the rest of the material. These 74.5 pounds of digestible protein and carbohydrates plus the 4.3 pounds digestible fat are the equivalent of 84.2 pounds of starch in food value.

But during digestion in the paunch this 100 pounds of corn has given off a quantity of marsh gas that contains food value equivalent to a little more than ten per cent. of its value, or 8.7 pounds digestible material. Deducting this from the 84.2 pounds, leaves 75.5 pounds digestible material that is actually at the disposal of the animal for heat, muscular energy and renewal of waste tissue.

In the particular case of the corn, it is probable that in ordinary weather there is but little more heat produced by the various operations of the body in the mastication and digestion of the corn than is needed to keep up the necessary bodily temperature, and hence the whole of the food value of the corn would be used without loss, and the figures given above 75.5 pounds represents the real value for maintenance of the corn. Even if this value is somewhat high, owing to some waste heat, it is still true that the food value of other similar grains if figured in the same way, would show similar errors and in nearly the same degree.

When, however, a comparison is made between grain and coarse fodder, the results are not so reliable. If 100 pounds of timothy hay are fed to a ruminant, 51.6 pounds will be digested, equivalent to 53.3 pounds of starch. The corresponding loss from the marsh gas formed during digestion will be 11.4 per cent., or 61.1 pounds, leaving 47.2 pounds as the net food value of the 100 pounds of hay.

Is it correct to compare this with the 75.5 pounds already given as the value of 100 pounds of corn? The only thing that can interfere with the correctness of the comparison is a difference in the amount of waste left. In masticating a pound of corn there are 26 units of heat set free, while in masticating a pound of timothy hay 348 units of heat are produced. If the heat from the corn was just enough for the needs of the body then there must be a large amount of waste heat from the hay. Therefore, we can say that if the 75.5 pounds of

corn represents just net food value, then the 47.2 pounds of hay is changed partly into waste heat and the real food value for maintenance is less than this amount. And therefore it will not do to use figures derived in this way for comparing the feeding value of concentrated grain and coarse fodder. All we can say is that the pound digestible from grain is worth more for food than a pound digestible from coarse fodder. How much more we cannot say, but some tests by actual feeding, made on this point gave a value of about one and one-sixth times as great for the grain as for the hay.

Treated in this same way the following values are gotten for the various feeding stuffs:

Maintenance Value in 100 Pounds of Each.					
	Total dry matter.	Total digestible organic matter.	Starch equivalent.	Food value lost in marsh gas.	Net food value for maintenance.
GRAINS:					
Corn, dent,	89.4	78.8	84.2	8.7	75.5
Gluten meal,	91.8	80.1	93.8	5.6	88.2
Wheat bran,	88.1	54.1	57.5	5.12	52.3
Oats,	89.0	60.7	65.9	5.9	60.0
Cottonseed meal,	91.8	66.3	81.5	2.4	79.1
COARSE FODDERS:					
Timothy hay,	86.8	51.6	53.3	6.1	47.2
Corn stover,	59.5	24.8	35.7	4.5	31.2
Oat straw,	85.7	40.6	41.6	5.12	36.4
Corn silage,	20.9	12.6	13.5	1.3	12.2

RELATIVE VALUE OF DIFFERENT FODDERS.

The second phase of the subject is the question of the relative value of different fodders, when fed to animals that are expected to make some return for the food they consume. This is the practical phase of the problem, but is much more difficult to answer, because the animal waste so much of its food or uses it in ways that can return no profit to the owner. These wastes are of several kinds, as follows:

1. Loss by fermentation and the giving off of marsh gas. This has already been mentioned and is always a complete loss, no matter for what purpose the animal is kept. In ruminants this loss is about ten per cent. of the original value; in the horse a little less and in the hog and in human beings scarcely any at all.

2. Loss by fermentation and the production of carbonic acid gas—carbon dioxide. This produces just as much heat as though the material was made into flesh and regularly burned after being worn out, but none of the material so fermented can possibly be of any use

in the body for the production of milk, meat, wool, etc., and it is difficult to conceive how it can be of any value in the production of muscular energy.

3. All solid food requires some force to grind it and although this force is changed into heat, yet whatever part of the food is used to produce this force, certainly cannot be used to produce any work for the owner, or to produce anything else of value.

The particular part of the food that requires most of the energy in grinding is the fibre. In general it can be said that the more fibre a material contains the larger amount of energy will be required to masticate it. An average figure is about 1200 units of energy for the mastication and digestion of each pound of crude fiber in the original food. As this crude fiber is on the average about half digested, it will yield to the body about 700 units of energy. Therefore when an animal from whom production is required is fed material containing crude fiber, the animal gets 700 units out of each pound and uses up 1200 in masticating it, or in other words each pound of fiber in the food causes a net loss of about 500 units of food value. This is about the amount of net value that is supplied by a third of a pound of first class digestible food. In other words each pound of fiber requires the value of a third of a pound more to handle it.

Nevertheless, fiber cannot be omitted from the food of our animals for two reasons. The first is, that the system of the steer needs some bulky material to distend the paunch and enable the animal to chew the cud; the second reason is, that fibrous fodders are so much cheaper than the non-fibrous that it is the part of commercial wisdom to make use of these fodders even though they are not highly nutritious.

4. The three wastes so far enumerated are well known, and can be estimated with a fair degree of accuracy. In addition to these there is the amount of energy required to digest the food and the amount used up by the body in carrying on the processes of life, of respiration, circulation, etc. Experiments on the first of these are not numerous, and have been performed on non-ruminants. A rough estimate can be made that after subtracting the energy required for handling the fiber in the food, the energy for digesting the remainder will be equal to ten per cent. of the value of the digested food other than fiber. Experiments have not progressed far enough yet to make any definite statement as to the amount of energy used in carrying on the processes of life.

The kind of food probably has but little influence on the last factors mentioned and as they will be fairly uniform for animals under the same conditions, even though the food is varied, they can be omitted in discussing the relative value of foods.

There are then three items to be deducted in determining the value of a food for producing a return to the owner, viz: Loss by fermentation, the production of marsh gas and carbonic acid gas, and the amount of energy used in the mastication and digestion of fiber. The loss by fermentation in the case of ruminants and horses is approximately one-fourth of the food value of the digestible carbohydrates and fiber. The energy required for handling the fiber has already been given as 1200 units for each pound of fiber, equivalent to the value of two-thirds of a pound of digestible starch.

When these additional deductions are made to the figures already given the account stands as follows:

	Gross food value.	Net food value for maintenance.	Deduct for fermentation.	Deduct for fiber.	Total food value lost.	Net food value for production.
GRAINS:						
Corn, dent,	\$1.2	75.5	7.4	1.4	8.8	66.3
Gluten meal,	92.8	88.2	4.8	3.3	8.1	80.1
Wheat bran,	37.5	52.3	5.4	5.9	11.3	41.0
Oats,	65.9	60.0	5.3	6.1	11.4	48.6
Cottonseed meal,	\$1.5	79.1	2.9	3.6	5.6	73.5
COARSE FODDERS:						
Timothy hay,	52.3	47.2	4.8	18.2	23.0	24.2
Corn stover,	35.7	31.2	3.6	12.6	16.2	15.0
Oat straw,	41.6	36.4	4.3	21.5	26.2	10.2
Corn silage,	13.5	12.2	1.2	3.9	5.1	7.1

Outside of the feeding stuffs that contain considerable oil, the figures obtained after making the deductions have much the same relation to each other as the original gross values, so that in institute work the past winter I have said nothing of the losses that occur and have taken the relative value of the ordinary feeding stuffs to be represented by the total digestible organic matter. This really makes a very fair basis for comparison between grains of the same general character, but when fodders of different character are compared it should be remembered that a pound of digestible material from an oily fodder or one rich in protein has a little higher value than from an ordinary fodder.

But when one attempts to compare concentrated fodders with coarse fodders it will be noted that the amount deducted from the coarse fodder for waste is much larger proportionately than from the concentrated fodder. It is not correct therefore, to compare concentrated with coarse fodders on the basis of total digestible material. A pound of digestible material from a coarse fodder always

has a less value than from a concentrated fodder, and the coarser, i. e., the more fibrous the fodder, the less the value of each pound of digestible material.

The practical application of the knowledge of the relative value of fodders is in the determining which is the most profitable to buy, and this is ascertained by estimating the relative cost of a pound of digestible material in each of the different fodders offered in the local market.

This is ascertained as follows: Suppose in the local market, i. e., at the railroad station, the prices are per ton: Bran, \$10.00; corn, \$22.00; oats, \$26.00; gluten meal, \$24.00; cottonseed meal, \$28.00; timothy hay, \$12.00; corn silage, \$2.00; then the relative cost is as given below:

	Pounds per 100.	Cost of 100 pounds.	Price per pound digesti- ble.
			Cents.
Wheat bran,	57.5	\$0.90	1.6
Corn,	81.2	1.10	1.3
Oats,	55.9	1.20	2.0
Gluten meal,	83.8	1.20	1.3
Cottonseed meal,	81.5	1.40	1.7
Timothy hay,	52.3	0.69	1.1
Corn silage,	13.5	0.10	0.7

According to the above figures, the corn and the gluten meal would be the cheapest of the concentrated fodders, and the silage would be cheaper than the hay. The hay is cheaper per pound digestible than the corn, but it will not do to argue that it is any cheaper, for the pound digestible of the hay is not as valuable for food as the same amount from the grain.

To understand the entire problem, it will be necessary to take account also of the fertilizing value of the fodder. These values are approximately as follows in dollars per ton:

Wheat bran,	\$12 46
Corn,	6 78
Oats,	8 49
Gluten meal,	16 40
Cottonseed meal,	24 88
Timothy hay,	5 36
Corn silage,	1 30

The rule then is to buy that fodder which furnishes the desired feeding value at the least cost, but if prices are nearly the same, choose the one which will at the same time give the largest amount of plant food. Also when prices are approximately the same, select that grain which contains the largest amount of protein, since this is the part of the food which is usually most lacking in the fodder grown on the farm.

In conclusion, I desire to call attention to two facts. The first is that a fodder largely composed of fiber has little place in the ration of a first class milch cow. A fodder may be so full of fibre as to be not only worthless, but a positive detriment. Newspaper is almost pure fiber and none would think of feeding that to a cow. Rye straw is not much better. Even oat straw which is so much fed, is a detriment rather than a benefit. The second table given shows that of each 100 pounds of oat straw there is left but the value of 10.2 pounds after taking out for what takes place before digestion. If from this is subtracted the energy required to digest the food and carry it through the system and the corresponding share of the work of keeping the body alive, there is no net food value. Since the good milch cow needs all her energies to digest real food, it follows then that feeding her on straw would be a disadvantage for the double reason that it contains no net nourishment in itself, and fills up the paunch, thus occupying space that is needed for handling more concentrated fodder.

Lastly, it is well to bear in mind that drying a fodder decreases its food value, because it increases the amount of energy required to masticate it. Hence the more succulent the food the higher its value per pound of digestible material. This is one of the strong arguments in favor of silage. The relation is about 47 to 72, that is, if when a fodder is green it requires 47 units of energy to masticate it, then after it is dried, it will require 72 units of energy.

PREPARATION OF THE SEED BED.

BY DR. I. A. THAYER, *New Castle, Pa.*

To understand the importance and the methods of its preparation, one must thoroughly comprehend the purposes of the seed bed. Hence we first study these purposes:

1. The first purpose in such preparation is the destruction of weeds and their removal beyond the reach of tillage implements. (By "weeds" we mean any plants not wanted in the bed.) Should

these be so plentiful or of such a nature as to endanger soil capillarity, when turned under the bulk should be removed before plowing is begun. In any case they should be turned to sufficient depth to be out of the reach of tillage implements, to secure their speedy decay, and to prevent their interference with capillarity.

2. The second purpose is the securing of ample root pasturage for the coming plant. This requirement differs with different plants, since some are more deeply rooted than others. The potato, the beet, the clovers and some others are notable examples of deeply rooted plants; while the smaller cereals are shallow rooted. But all require far more room than is generally supposed. Corn, for example, has been termed a shallow rooted plant. So it often is, of necessity. While the majority of its roots run near the surface, because of the greater amount of available plant food there, many of its roots run to considerable depth. I have broken the roots of a hill of corn thirty inches high, at a distance of nearly two feet below the surface, and found in a mass of soil three feet in diameter a network of roots permeating the mass. A cornfield whose plants have reached the height of three feet will be found permeated from row to row with roots, many of which, if they have an opportunity, will extend at least two feet below the surface, showing the necessity of an occasional deeper preparation than is usually given this plant, if the effects of August drouth are to be avoided.

3. The third purpose of the preparation of the seed bed is most vital, and may be said to be the supreme one. It is to bring the soil into most intimate contact with the hair-like rootlets of the plant. It must be remembered that the plant food held in solution by the soil moisture is absorbed chiefly by these hair roots, and not by the larger ones. That at the point of contact of the soil with these rootlets there is a kind of digestive process that goes on, in which an acid exudes from these rootlets, corrodes and transforms insoluble plant food coming in contact with these roots, and thus prepares it for absorption and circulation. If, therefore, the soil is not well fined and compacted the rootlets cannot reach it and the plant must starve.

4. The fourth purpose is to conserve moisture for dissolving plant food. It must be understood that in the measure of the fineness of the soil particles will be the soil's capacity to hold moisture. Not only this, but the extent of this pulveriation measures the size of the reservoir.

5. Another purpose is to bring from beneath the surface soil fertility that had leached down. It will often be found in old cultivated fields that there is more potash, for example, in the second four inches of soil than in the first four inches; and sometimes more in the second eight inches than in the first eight. The tendency of all

soluble plant food is downward, and one of our purposes is to bring it back, as well as to loosen the soil and so aerate it and reduce the potential to available food with the action of oxygen. Thus the vital process of nitrification is promoted and the table spread for the hungry rootlets of the young plant.

6. The last purpose I will name is to facilitate future tillage. A hurried and imperfect preparation not only cheats the plant of its food, but cheats us of our time. Too often it is thought a sufficient preparation consists in making it barely possible to introduce the seed, and that the main work of preparing the soil for the plant is to be done with subsequent tillage. No mistake could be more fatal, since in case of the smaller cereals there can be no subsequent tillage; and in the case of inter-cultured crops the greater need of well prepared soil is felt while the plant is in its feeblest stage, and before further tillage can well begin. Besides, it is far easier to put the soil in good mechanical condition before there are tender plants in the way than it is to do that work afterward.

Keeping each of these purposes steadily in view, we next study the means by which we can best accomplish them.

1. I name plowing as the chief means. I expect proper plowing to accomplish three-fourths of the preparations of the seed-bed. This first and vital operation is so laborious and expensive that it should be made to yield the greatest possible results. I have no time to give it the attention it deserves, but must content myself with briefly sketching a few of the more important points.

To effectively reach our first purpose—the proper disposition of weeds, the jointer is an indispensable adjunct to the plow. Its shape and setting are important. Too many jointers are too narrow and stand too nearly perpendicular, simply cutting a narrow groove in the ground; and if set deep enough to sufficiently denude the upper edge of the furrow slice, it throws so much earth behind the slice as to cause it to fall back. It should be broader, in form more nearly that of the plow itself, so that one-third of the furrow slice may be denuded of its surface without throwing over sufficient earth to prevent the furrow slice from maintaining its place. Thus formed and set, trash and weeds are thrown to the bottom of the furrow where they will decay, instead of growing from between the furrow slices and be out of the way of tillage implements; while the upper edge of the slice will be bare and more easily pulverized in subsequent operations.

2. Another very important matter looking to the pulverization of the soil, is the form of the plow itself. While the long, wedge-shaped plow, once in so much favor, is of slightly easier draft, its flat, unbroken furrow slice is pulverized with comparatively great difficulty.

The mould-board should possess a bold curve outward and over, so that the furrow slice will be caught for an instant and pushed on itself slightly before it is delivered. This slight movement of the earth on itself accomplishes much in breaking up and pulverizing the slice. Thus, too, the slice is left more nearly in a perpendicular position than is that made by the long, narrow plow, and by so much is more readily attacked and subdued with the harrow. The increase in draft by this change of mould-board will cut a very small figure. It has been ascertained that in the ordinary plow, 55 per cent. of the whole draft is expended in cutting the furrow-slice, 33 per cent. in the friction of the sole and land side, and 12 per cent. in turning the slice. Thus it is seen that the force required in turning the slice is a very small part of the whole, and this bolder mould-board could add but very little to the whole draft.

I might add that the rate of speed at which the plow or harrow is moved has much to do in pulverizing the soil. The rate of the roadster and that of the Clydesdale or Shire are equally out of place on the field. The movement of the average coach horse is better. In ground practically free from stone and roots the gait should be as rapid as practicable, a brisk walk being far more effective than is a slow one.

3. When shall the plowing be done? Is an important question, and one difficult to answer without specific conditions before us. In some cases the plow is not necessary; for example, a potato field that has been well cultivated and is to be seeded to wheat, rye or crimson clover. Here an ideal seed-bed is easily prepared with the harrow alone. Another case would be a corn stubble on a loamy soil that had been unwisely allowed to lie over without a cover crop. This could be well prepared for oats or barley with the disc harrow, finished with the Acme.

The more important phase of this question relates to the season. Shall we plow in the spring or fall?

In the case of a stiff sod, especially one of long standing, I invariably plow in the fall or winter, and for several reasons: First, because I want the land, long unstirred and unweathered, turned up to frost, sun and air to undergo the chemical changes necessary to convert its potential to available plant food, and to be thoroughly pulverized by the action of the frost. To put the ground into condition to receive and retain stores of moisture for summer use, and to be ready for earlier seeding than would be possible on spring plowed ground. To accomplish these ends and others, it will be necessary to plow deep. In this case there will be no danger of serious washing or puddling. Again, I like to plow such ground in the fall or winter because at this season the team is in better condition, the weather is cooler, and I have more time to devote to this work.

Spring plowing of heavy clay cannot be deep, for the reason that the raw soil would not be ready for the young plant, and for the further reason that usually the excessive moisture forbids early plowing of such soil.

March plowing can often be safely and profitably done, even when the ground is quite moist, and at considerable depth, for the same reasons that prevail in winter plowing. And it may be added this is the most favorable season for the destruction of the grub.

It will be found valuable and usually practicable to plow a given field alternately deep and shallow. This will receive frequent deep stirring of the soil in order to bring up the leaching fertility, form a deep reservoir for moisture, provide larger root pasturage, and prevent the formation of floors by the action of the sole of the plow and the tramping of the team.

Subsequent operations, however important, can receive at this time but brief mention. Harrowing, of course, is the chief operation after the plow. Usually in spring work this should not be delayed longer than is necessary to dry the plowed surface to a friable condition. If left longer it will bake and the surface be filled with dried clods, while the escape of moisture will be serious. Generally the latter hours of the day on which the plowing is done should be given to harrowing all that part of the day's plowing that is in condition to be finely pulverized. This will break up the smoothed surface of the furrow slice so as to prevent baking, while it covers the surface with a mulch of fine earth that will check evaporation.

There is another important place for the harrow before its final operations. In case of a field like corn stubble that has been left bare during the winter and awaits a condition sufficiently dry for plowing, we find our worst clods. Before it has dried to sufficient depth to admit the plow, the surface, if a clay soil, will be baked like a pavement, and if plowed in that condition, the operation will not only be tedious, but the clods will be well nigh unconquerable; and what is worst of all, they will be plowed under, so that while we may secure a surface that has the appearance of having been well pulverized, the under stratum where the roots of the plant will appear will be clods and interstices in which the rootlets of the plant will perish. Here then is the most important work of the harrow. Just as soon as the surface is simply friable, neither muddy nor hard, a heavy spike-tooth harrow should be put upon it, knocking down the stubble and pulverizing two or three inches of the surface. This disposes of the stubble, prevents baking of the surface and the formation of clods, and instead of clods as the substratum, the finest soil of the field goes under to form the bed for the plant rootlets. Thus, too, the labor of plowing will be reduced one-half.

If the plowing has been properly performed, the operation of

finishing the work will have been greatly reduced; and yet, as a rule, nearly as much time will be required as has been devoted to the plowing. We stop the harrow too soon.

The aid of the roller may often profitably be invoked, though some caution must be exercised in its use. A moist clay soil will be too firmly compacted; though a loose sandy soil cannot be rolled too much. For the smaller grains the soil must be well compacted, after having been thoroughly pulverized and areated, in order to restore capillary attraction, facilitate germination, and give a close contact of soil with rootlets.

In turning under cover crops, as a rule, the ground should be well rolled; but in no case should rolling be the last operation. The smooth, firm surface left by the roller should always be broken with a light harrow or weeder. This can be most economically done with a weeder-like attachment, temporarily made to the rear of the roller.

Thus with the aid of a proper jointer we have disposed of the weeds; with deep plowing we have furnished ample root pasturage and an extensive reservoir for moisture; in the thorough pulverization of the soil we have given the hair roots access to their food, which we have furnished in lifting the escaping fertility, areating the soil and increasing its moisture holding capacity; and in all this thorough preparation we have made easy the future task of tillage.

So we have met the demands of the coming plant. Our seed-bed is ready. We stand upon it as the basis of our hope, for we have well learned the wisdom of our motto: "Less acres and better culture."

If by defect it sinks beneath our feet the star of our hope will stagger on the horizon. If we stumble over clods the star will disappear. But with a seed-bed deep and fine and firm and level and rich, our star will rise, steadily luminous, until it emblazons our way to a joyous harvest home.

EIGHTEEN YEARS EXPERIENCE IN SOILING.

BY REV. J. D. DETRICH, *Flourtown, Pa.*

It is twenty years ago, through a force of circumstances, not by choice, that the author of this paper fell into possession of a fifteen acre farm. A farm of this size was not supposed to be a source of income in the neighborhood in which it is located, and the new owner's experience after one year's trial of pasture and the customary rotation of crops, convinced him that the opinion was well founded, and that there was no profit, not even a living on farms of small

acreage, under the old method of pasturing and rotation of crops. The aspect at the close of the year, to which we have referred, was not a cheerful one, interest on mortgage was due, taxes were to be paid, and the laborer looked for his wages.

Amidst these gloomy surroundings, it was time for something to be done to bring relief, either dispose of the property at a serious loss, or adopt a new method.

Book farming as it is called, always produced a smile when suggested, and any attempt made to follow scientific instruction in growing crops and breeding cattle, was looked upon with discredit.

The writer being very fond of natural science, when at College, turned to his library, drew from it a book on organic chemistry, by Sir John Læibig, and in a foot note, was directed to the Agricultural Colleges and Experiment Stations established over Europe, and a few in the United States, and it is to these few, that the credit is due, for what the fifteen acre farm is to-day. The information gleaned from the best farm papers and agricultural bulletins, radically changed the system of conducting the scanty acres. In Europe we found the small farm was the rule, in America the exception.

Along with other literature, it was our good fortune to come into possession of De Quincy's book on soiling, and with a supply of books, such as has been mentioned, a course of study and industry, began anew on the farm. The plan of soiling the dairy cattle was adopted, over against the extravagant method of pasture. It was conducted carefully and observingly, but not with the good results that was claimed for it.

The production of milk from crops grown and fed in the stall were not equal to the same animal's yield when on pasture. But the saving of manure by the soiling system was a marked advantage. Some one has said that no one runs deeper than he plows, and the eighteen years experience in soiling suggest that no one plows wider that the land is manured.

It was about this time that the balanced ration of Wolf was being discussed in the journals and agricultural magazines, and gave the writer a great deal of information that was entirely new on the feeding of a dairy animal for profit. The adopting of the balanced ration by Wolf, as a guide, and not as an absolute mechanical rule, made the soiling system a real success.

To carry on the soiling system, many changes were introduced into the dairy barn for the comfort of the dairy animals. Cement floors, additional windows, ventilators, platform stalls, well made water-tight gutters, with cement bottoms, so as to retain all the manure possible, bedding cut one quarter inch, water introduced direct into the dairy barn, convenient feed spouts and all green and dry forage run through a cutter and dropped down into feeding passageway.

Convenience and cleanliness are the watch words of the dairyman. Clean cattle, clean milkers, clean dairy barn and clean vessels stand for clean milk. For no strainer will strain dirt out of milk. The soiling of the dairy animal means cleanliness; she must be curried for the sake of health as well as cleanliness. And strict attention must be given to all sanitary regulations in caring for milk according to our modern civilization.

After all these years of experience in soiling, nothing would induce a return to the old system of rotation and pasture. By soiling, the acreage of the fifteen acre farm is increased at least four times. The product of the dairy is coveted, because there is never any flavor of grass, weeds, garlic or any foreign taint imparted to the product of the dairy.

The cows have a longer period of lactation largely accounted for on account of regular supply of water, food and attention. There are now in vogue two systems of soiling. The one is the growing of the green crops in the field and having them come in succession so that there is an abundance of green feed at least for seven months in the year in the climate around Philadelphia. The other, and the one most likely to be adopted and is a real boon to the large farms as well as the small and is entirely practical for both, is the soiling of green crops for summer use as well as winter. The silo has been the indispensable factor on the fifteen acre farm since 1882. An abandoned chicken house on the little farm was converted into a primitive silo to store the succulent food of summer for the Jerseys. It was a venture to risk money, time and machinery twenty years ago, when every one was laughing at the silo and the book farmer, but to-day the earnest inquiry is how can I get one? There are now two sixty ton silos on the same little farm.

The advantages in soiling are so numerous in the experience of the writer that he has concluded that no man but a rich man can afford to pasture a cow. Pasture is wasteful, soiling economic.

Pasture is like killing an ox for his liver, soiling is the saving and using of the entire animal. The animal on pasture has one mouth to eat and four feet to tramp. In dry weather, the grass is pulled out by the root, in wet weather is tramped into the mud.

Fences long ago were abandoned as expensive and useless, in this item alone much has been annually saved.

The acres are the same to-day on the little farm, but the crops have increased beyond the owner's most sanguine expectation. The same farm twenty years ago on which one horse and two cows were kept and some hay bought to supply the food deficiency. This last year I wintered 16 cows in milk, 1 Jersey bull four years old, 4 heifers two years old, and 10 head of young stock ranging from 15 months down to 3 weeks, and two horses. All hays, bedding and silage were, last

year, grown on the fifteen acres, and none purchased at all in the market. We attribute this wondrous yield to the soiling system. It lifted the mortgage, paid the taxes and the labor and finds its owner not complaining that farming doesn't pay.

RENEWED FERTILITY AND HOW TO GET IT.

BY MR. THOS. J. PHILIPS, *Altoon, Pa.*

In conversation with farmers in many different localities and under varying conditions I find the almost universal complaint to be that reward for capital and labor on the farm is growing more hazardous each year, and yet I am convinced that the carefully managed farms are producing more than formerly. The turning point from tearing down to building up has already made some progress. Interest is being awakened and the near future will show marked improvement.

Our great difficulty is not how to make plants grow under favorable conditions, but what can we do to our farms so that we may be reasonably sure of success under adverse conditions? Before answering this question, permit me to hastily review the past. The generations before us found a virgin soil full of plant food, both mineral and organic, the latter being easily broken down became available as fast as the plants could take it up, and became exhausted in the first few generations. More particularly because there being no home market in the beginning of any new country the entire product is sold off and depletion of soluble fertility is rapid. Later we enter the period when crude products are consumed on the farm, and only by products more valuable but containing less plant food are sold, and the deterioration of soil is checked or ceases entirely. At this stage the use of lime as a stimulant became common. The lime added no plant food, but did assist to burn up the organic matter and release potash from the silica, and at the same time cause a physical condition that was decidedly advantageous. But if the old methods were continued and the product sold in bulk, the use of the lime was decidedly injurious. The last condition was worse than the first.

Until recently the value of farm manures was little understood. We all knew they were valuable, but manure from a full grown animal and that from a young or growing one, was presumed to have equal value, but the chemist tells us the first is three times richer than the second.

Possibly the solid manure was cared for religiously, but no thought given to the liquid, except to get rid of it. Now we know that they have about equal value as plant food; the nitrogen being equally divided between the solid and the liquid. The phosphoric acid being all in the solid but the potash almost entirely in the liquid.

About forty years ago commercial fertilizers came into general use in my neighborhood, and the quantity and possibly the quality used has increased from year to year until now no profitable yield is anticipated unless a generous share of the proceeds is advanced in preparing the seed bed. Of the \$5,000,000 expended annually for commercial fertilizer in Pennsylvania, perhaps two-thirds is contributed by nine or ten counties in the south east. The drain upon the resources of the farm for this item alone is enormous, and yet it is money well expended, if done with a fixed determination to restore the land to its former condition, when their further use may be cheapened and modified.

The Experiment Station informs us that every acre of ordinary good soil nine inches deep contains more than two tons each of nitrogen, phosphoric acid and potash, and yet we find in practice that eight or ten pounds of the first and last with twenty-five or thirty pounds of the second applied to an acre show marked improvement, because the tons are not soluble and not available as plant food, but the pounds we buy are ready for use immediately. I am convinced that the difficulties we complain of are due largely to absence of vegetable matter in the soil. In nature the ground is covered with vegetable growth every year, which when decayed supplies humus. Modern agriculture removes this vegetable matter to the sewers of the cities and towns, or across the ocean. Can we work our farms hard and yet increase the supply of humus? Is this the burning question? Certainly. Thousands have done it and other thousands are doing so.

First, let us care for the manure of our farm animals and apply to the soil direct from the stable. Use lime if you will, to assist in liberating plant food, but return the vegetable product to the soil in generous quantities; plow down second crop grass, rye, crimson clover, cow peas, etc., which cost little for seed, and practically no labor. Humus holds water and yet affords drainage, and keeps the soil light and porous, which is essential to growth of clover. I am convinced that failure of clover to hold through the winter is due to compactness of soil. It holds water to the surface in early spring and excludes air and the clover roots are smothered and drowned.

On your truck patch which has been heavily coated with vegetable manure year after year, clover does not die in winter, or on the new ground recently reclaimed from forest growth you have no difficulty. An upland, stony spot that is cropped but seldom, and not suited to

the use of machinery often grows beautiful clover, while the smooth field over the fence scarcely shows a trace one year after seeding. Nature is speaking to us in her most convincing manner. Will we not heed? After years of experiments with crimson clover, I can look back upon but one complete success in field culture. That was sown in corn in August on a worn out pasture of many years standing, which had not been cropped to death, while many acres equally promising in November died in February following on fields much better supplied with plant food, as we usually understand the term. But even though it has died, have I lost my labor and seed? Not at all. Last year on July 1, I sowed ten pounds of crimson clover seed per acre in corn, ahead of the cultivators at the last working. In November by digging, drying and weighing an experimental plot, found to my surprise that I had the equivalent of \$20.00 worth per acre of commercial fertilizer, or two tons of barnyard manure—total expense 90 cents per acre. Cow peas in the same field did equally well, though the seed cost twice as much.

It would be folly for me in a meeting of advanced farmers to comment upon the value of that crop as a nitrogen gatherer, protecting the otherwise bare soil from washing, adding vegetable matter, etc., even though it was dead in March. I shall continue along these lines only substituting rye on heavy clay soil, sowing the rye about July 1, in the corn, at the same time with the clover, hoping eventually to so alter the physical character of those fields that they will carry clover through the winter as well as other and more favored parts of the farm now does.

The process of tearing down, or what is commonly termed "wearing out" our land, has been the work of generations, and the building up must necessarily be the effort of years. On the ordinary farm with its five or six year rotation each particular tract is reached and worked only six or seven times in one generation, which should prompt us to make as much improvement as possible when opportunity offers.

Not less than 4,000 tons of water falls on each acre in this latitude annually, and yet there is scarcely any one in which we do not suffer at some time through the growing season for the want of moisture.

An acre of vigorous rapidly growing corn will pump out one ton of water in twenty four hours. A large tree will require as much. Not enough rain falls during the growing season to supply this quantity, but a sponge of humus beneath the surface helps us out. Humus holds seven times as much water as does sand. That even very rich soil may be improved by humus was clearly proven in the corn belt during the great drought last year. Those farmers who had energy enough to return their waste vegetable matter to the soil suffered least.

My attention has been repeatedly called to the beneficial effect of wood ashes applied to clover; or as a preparation of the seed bed, the 5 per cent. of soluble potash in the ashes is doubtless the energizing principle. Clover analyzes 44.5 pounds of potash to the ton, and while it can and does gather a share of its seventy pounds of nitrogen from the air, it can draw its potash from the soil alone.

Therefore, I conclude that a soil well filled with organic matter and free from potash are necessary to success in growing clover. And I need no argument to convince me that when I can grow two good crops of clover in one rotation, one to plow under and the other to feed dairy cows, that I have solved a troublesome problem.

AN INEXPENSIVE AND UP-TO-DATE COW STABLE.

BY DR. M. E. CONARD, *Westgrove, Pa.*

An inexpensive cow stable is one that possesses conditions which favor cheap production of good, clean products and insure good health to its inmates. An expensive stable is one which places around its inmates and their products such environments as do not favor the greatest amount of satisfactory returns for feed and care bestowed. If a manufacturer can by the use of improved machinery and buildings reduce the cost of the output of his factory a fraction of 1 per cent., and thereby insure a profit on his goods, why is it not reasonable that we should so improve our milk factories as to reduce the cost of production that we may have a reasonable profit on our work and investment.

The machines in our dairy barns are not propelled by steam, electricity or water; the amount of power used is not directly under the control of the engineer, if such he might be called; a glance at the steam gauge, a shake of the fire or a turn of the throttle valve will not be followed by an immediate increase in the bucket; the machinery is more complicated and requires for its successful management a more general knowledge of cause and effect. There are comparatively few of the inmates of our barns that are producing anywhere near the maximum limit of their capacity, and why? Because there is something in the care, surroundings or food that is not fully in accord with the requirements of nature; the food is not doing its best, or the throttle valve is not fully open. A handicap of any kind, from any cause, on the energy of the dairy cow causes an irre-

coverable loss and the amount cannot be estimated. It may result from many causes. The stable may be good and the food and care lacking, or the individuals may not be of good selection or kind; but be that as it may the first essential to any herd is a good house to live in—one that will protect its inmates from the objectionable features of the elements and yet allow them to enjoy and be benefited by conditions of weather and atmosphere as are conducive to good health and vigor, then if the food and treatment is right they will be comfortable and profitable machines.

Now by so constructing a cow barn as to remove the many very objectionable features so often seen—such as darkness, the lack of sufficient ventilation, ceilings hanging with hay and cobwebs loaded with dust, uneven floors containing numerous pools of urine and soakage befouling the occupant and penetrating the soil so as to constantly give off strong odorous gases, keeping the air unfit for the contact with milk and should not be breathed by the inmates, the bulky troughs, stalls and racks obstructing light and free change of air and favoring the collection of dust and dirt in the many dark corners in their construction—we will reduce the running expense, because each and every one of the features mentioned is a handicap directly in opposition to the natural surroundings and needful conditions of our domestic animals. How can this best be done? If a new stable or barn is to be built the question is easily answered; but the best way to renovate and reconstruct our old bank barns is the question that confronts the greatest number.

In the days of our grandfathers, when cattle feeding was the principle industry of the eastern farmer, the bank barn with its dark basement probably answered a very good purpose, but the dairy cow and her perishable products demand entirely different environments. The first and most important correction of such a barn is the introduction of light, and plenty of it. This oft times reveals very disgusting conditions previously unnoticed which serve as a stimulant to better conditions. Windows should be placed in all sides of the barn. If the banks interfere with putting them in the wall they can be placed above the wall in the weatherboarding, with a sloping chute cutting off a small corner of the hay mow, allowing the light to strike the floor at a point much further toward the centre of the cellar than the light that enters through a window in the wall near the floor. The windows should be as large as space will admit of and not be constructed with frame work to protect the glass from breakage; they should be hung on hinges so as to open readily to aid in ventilation. The light is insufficient if a newspaper cannot be read with ease in any part of such a stable.

Now we can see the work of ages represented by so many long years of innocent toil of the industrious little spider, who so loves to

work in dark corners and has found every conceivable condition he could wish for in the construction of the ceiling, with the boards or rails placed apart so as to permit the hay and straw to offer a framework upon which we find the handiwork of the most accomplished spider of this progressive age in competition with that of his grandparents of many generations, long gone to rest, all dust ladened. Now the best remedy here is a ceiling of jointed boards nailed on the under side of the joists, but the story is usually so low that it is often desirable to construct a light floor above the joists, so as not to lessen the already limited air space in stables. This can be done with cheap boards of irregular width and edges, if necessary, by covering the crevices with strips or slabs so as to prevent the dropping through of dust and dirt, and to present a surface below that is easily white-washed. This can be very cheaply and rapidly done with an ordinary spray pump and will add greatly to the light. The side walls should be made reasonably smooth by dashing with mortar, so that it, too, can be readily whitewashed.

The floors should be so constructed as to provide good and sufficient drainage and to preclude the possibility of liquid manure soaking into its surface. The material of which it is made may depend somewhat upon the kind of material most available. The first and most important feature in a stable floor is a trough to catch and carry off the droppings, and this should be made of either plank or cement, preferably the latter, with sufficient fall to secure good drainage in case it should become necessary to flush them with water. The efficiency of such a trough depends much upon its shape and depth. It should be wide at the top and the stable floor should fall gently towards it; the elevation of side of gutter next to cows hind feet should be about eight inches and should slant about two inches towards the cow; the bottom should be fourteen inches wide and the back rise should be only four inches and should slant back away from cow one inch, so if the bottom is fourteen inches wide the top of gutter is seventeen inches, which is amply wide. This makes a durable gutter of convenient shape, easily kept clean, will permit the direct rays of the sun to strike nearly all of the bottom of it and will catch all of the droppings if the animal is properly tied. If this gutter be made of plank, it should be constructed according to this plan shown on the chart, with the floor plank overlapping the edges of trough, etc., but cement is very much better, it is more sanitary and durable and little, if any more expensive. The fall from end to end of trough is of minor importance, as all liquids should be removed by absorbents and not by drainage; the fall is only needful when it becomes necessary to flush the gutter with water. The floor upon which the animal stands and lies may be of such durable material as most available. Good brick clay makes a good floor—cin-

ders, coal ashes and a little lime, or something that will not easily pulverize and create dust.

The feeding trough should be elevated from four to six inches above stable floor and should be 18 or twenty inches wide on the bottom, which may be very durably supported on a stone or brick wall on which may be built a 4x4 inch white oak piece, to form the side of trough next to the cow and on which the stancheon shall rest. The stancheon may be supported at the top by a 3x3 inch piece of less expensive material than the lower one, say hemlock, which should be placed 6 inches farther back than the piece on the wall, so the stancheon will set 6 inches farther back at the top than at the bottom, so the cow will lie down from 4 inches to 6 inches farther forward than when standing, which will aid greatly in keeping her clean. I prefer the swinging stancheon, hung on three or four links of chain top and bottom, giving sufficient liberty for perfect comfort, and yet controlling her position sufficiently for safety and cleanliness. The bottom of feeding trough may be of cement or an inch board covering the wall is preferable and it may be separated from entry by slanting partition about two and one-half feet high of light, cheap lumber, which may be held in place by small divisions in trough between stalls, bracing it to studding between cows; none of this lumber should be surfaced, as rough sawed lumber will hold whitewash much better than a smooth finish.

The entry floor should be of some material that could be swept daily without unwarranted dust; cement is preferable; coal ashes and lime mixed make a very good floor; boards are objectionable on account of offering harbor for rats, etc.

There are many points of convenience in the modern cow barn upon which I might dwell, but the object of this paper is to discuss only an inexpensive stable that possesses the up-to-date features, so I leave the matter with you at this point.

LIME AND ITS USES.

BY DR. WILLIAM FREAR, *State College, Pa.*

The Director of Institutes has requested me to prepare for this occasion a paper on the much and long discussed subject of lime and its uses, a subject about which each of my hearers has probably written or publicly talked. The main lines which my discussion of the topic must follow are beaten tracks, therefore to all. I shall

endeavor to bring into this paper, so far as time will permit, a brief mention of the results of the more recent investigations of this subject; so that the paper may be considered as a condensed supplement to the bulletin I sometime since wrote for the Department.

Line is the name applied to the white solid top when limestone is heated for a long time at a high temperature. By this process the lime is split into two parts—a gas, carbonic acid, which constitutes 44 per cent. by weight of a perfectly pure, dry limestone, and which escapes into the air and lime, which constitutes in such limestone, 56 per cent. of the original weight. This white residue, lime, is not, however, a simple or elementary substance, but can be, in time, split by appropriate chemical methods into two elementary materials. One, oxygen, the less abundant of the two principal components of the air; the other, bright, yellowish calcium. Because of these facts, pure limestone is called by the chemist carbonate of lime, or calcium carbonate, while lime itself is scientifically termed calcium oxid. So eagerly does metallic calcium seize upon oxygen that it burns with intense light when heated in air, and can be preserved only by careful protection from moisture. Lime or calcium oxid bears to the metallic calcium the same relation that iron rust and common iron ore have to metallic iron. This oxid, too, is difficult of preservation because of its strong tendency to unite with water to form calcium hydrate or slaked lime, and with the carbonic acid, which is ever present in the air, to form calcium carbonate. Air-slaked lime is a mixture of true lime, calcium hydrate and calcium carbonate.

Neither the metal calcium nor its oxid, lime, occurs in nature in free condition, except it is artificially produced, it is found in combination with acids, chiefly with silica and carbonic acids in rocks, with these and nitric and tannic acid in soils, with sulphuric acid in gypsum, with this and hydrochloric acid in mineral and sea waters, and with phosphoric, carbonic and organic acids in plants and animals.

Its importance to the farmer is found in these facts: That it has important relations to the living plants and animals with whose production he is concerned; that it is capable of producing extensive physical alterations in the soils of the farm; and, finally, that it is the cheapest, strong chemical agent of a wide variety of forms that the farmer applies in his laboratory, the soil.

Lime is essential not only to the highest productiveness but to the very existence of the plants cultivated on the farm; furthermore, not an organ or a tissue in their entire structure is without this constituent in one or another state of combination and degree of usefulness. The proportion usual in different growths differ greatly from one another, it is true; a crop of clover removes ten times as much as a crop of wheat or rye, and six times as much as a crop of

timothy. Among the organs of the plant, leaves and bark are richest. Though always present in seeds, it is much less abundant than potash and than the related substance magnesia, and is one of the first food materials required of the soil by the young plantlet.

Concerning the functions of lime in the plant, much uncertainty still exists. It is quite certain that all the lime present in most mature plants is not of immediate utility to them, from the conditions in which much of it is found to exist within their tissues. For in the young plant most of the lime is in a soluble condition, readily expressed with the sap, and commonly in the form of the soluble salt of some organic acid, such as malic acid; while in seeds much of it is present in the endosperm or reserve food in combination with the albuminoids, which its association renders more capable of movement to the point of growth when germination occurs. In older plants, conditions are very different; much of the lime tends to separate in the form of insoluble crystals of calcium oxalate; sometimes granules of calcium phosphate separate and oftentimes calcium carbonate; the last named compound is found in particular, as an examination of the older cell-walls. It is doubtless true that one of the important uses of lime is to neutralize the oxalic acid that form in considerable quantity in many plants, as the result of the oxidation of their materials during the breathing process, and that would, if allowed to accumulate, menace seriously the health and even the life of the plants. None of the other common bases readily taken up by the plant is capable of both neutralizing the oxalic acid and, at the same time, removing it in an insoluble compound, from the sap; for soda, potash and magnesia all form soluble neutral oxalates.

It is true that much of the sap of plants is somewhat acid, and that the growing points of most are distinctly so; nevertheless in many, if not all vegetable organisms, a portion of the tissues are, on the contrary, distinctly alkaline. If any great excess of feric acid is from any cause accumulated, serious injury results; thus, one of the observed facts concerning forced lettuce that has damped off, under the influence of too elevated temperature and the increased respiration it induces, is a marked increase of acidity.

Schleyer (1) has made the curious observation that the undradock growing upon a soil poor in lime, blackens and dies when sprayed with a 107 solution of copperas, or green vitriol, but that this weed is not injured at all by even a stronger solution in cases where it grows upon a soil rich in lime. The investigator suggests that in the former case, an excess of free oxalic acid is present, that prevents the union of the iron with the tannin of the plant to form a non-injurious compound.

If the formation of an insoluble oxalate is, however, the principal

(1) Deutsch. eder. Presse, 29, No. 2, 12.

function of lime in the plant, the similar bases, baryta and stomatic, should be capable of replacing it perfectly, since both form such oxalates. It is true that Patterson (2) has found a distinct crop increase to follow an application of baryta upon a soil profiting from the use of lime; but this may be explained by the chemical action of the baryta upon the soil, rather than in the plant. Loew (3) has found in experiments with twigs of *Tradescantia*, that barium and strontium salts are positively injurious when the quantity of lime present falls below a certain minimum.

In the bulletin previously mentioned, (4) I have briefly discussed the evidence of the belief that lime is essential to formation of cellulose, the substance of the plant's skeleton, and recorded the observation of Mayer and Cohn that beer-yeast, which builds about its spherical body, a thin wall of cellulose, dies so without requiring the aid of lime. It is now known that other lower organisms are capable of performing all their normal functions without lime. Loew (5) found this true of certain lower moulds, and confirmed the same observation made by H. Norisch, with reference to some of the algae. He thinks that only when the plant reaches a rather high degree of organization does lime become needful, and that this plant food is intimately concerned in the making of albuminoid compounds that go to form the nucleus and chlorophyll bodies of the plant, or in other words, its centers of reproduction and assimilation. The same writer, in conjunction with D. W. Nedy, had continued investigations upon the subject. (6) They note that magnesium compounds though essential in limited quantity to plant formation, are poisonous to it when in excess; but that the presence, at the same time, of a certain proportion of lime entirely prevents this injury; that the proportion of seven parts of lime in soluble combination to four of magnesia so combined is sufficient for the best results; that an excess of lime tends, however, to starve the plant.

The practical suggestion from the latter hypothesis is that whenever there is likelihood of excessive magnesia consumption by the plant, lime is a desirable fertilizer. Such cases occur in many soils very rich in magnesia as compared with lime, and where the less concentrated potash salts, such as kainit, are used, which are also rich in magnesium compounds.

Whatever the explanation, it is found that most plants grow more thriftily on a calcareous soil than on one deficient in this food; the stems are stronger and stockier and the entire plant more vigorous. F. Wohltman (7) recently observed its tendency to stiffen cereal

(2) Bulletin 66, Md. Exp. Station.
(3) Jahresbericht f. Agrik.-Chem., 1898, 203; Bulletin 18, Div. Veg., Physical and Patte., U. S. Dept. Agric.

(4) Bulletin 61, Pa. Dept. Agric., pp. 58-9.

(5) Op. cit. supra.

(6) Bulletin 1, Bureau of Plant Industry, U. S. Dept. of Agric.

(7) Jahresbericht f. Agrik.-Chem., 1898, 188-9.

straw. There are, however, a number of imperfect forest and cultivated growths that are readily injured by taking up from the soil an excess of this constituent. The peculiarities of behavior of the so-called calciphile, or lime-loving, and calcifuge, or lime-avoiding plants have been quite fully discussed in Bulletin 61. I will not refer at length to the subject in this connection, confining myself to the mention of a few recent experiments relative to it. Hannamann and Kourwisky (8) have found a large gain from liming hops growing in soil deficient in lime. W. C. Sturgia (9) studying the effects of lime upon tobacco, finds that, notwithstanding the prevalent opinion among Connecticut tobacco growers that lime is injurious to that crop, the application of this material to the sandy tobacco lands of that State tends to reduce the "calico" disease to which the leaf is, in some localities, much subject. Adler (10) found a gain when lime was used with the white lupine, but an injury to yellow, black and blue lupines. The sensitiveness of the latter species to an excess of lime has been elsewhere discussed. B. Schulze (11) adds that the addition of even small quantities of lime to land receiving phosphoric acid and potash fertilizers was injurious to lupines. R. Ulbricht (12) also observes that the yellow lupine can not stand either a heavy liming nor a heavy potash dressing in conjunction with a light liming, and that this injury appears also in a crop grown the second year after the application. Curiously, the limed plants in this case, are said to be more slender than those not limed.

The farmer is interested not only in the vegetable friends that work for him in the formation of forage, fruit and grain, but also in those that work obscurely in the soil to prepare the raw materials which the more complex, surface-growing plants require for their operations. The soil is no more the abode of death than the air; on the contrary, there dwell in the darkness of the soil, hosts of friendly workers with which we are only beginning to become acquainted. Lime potently influences the activity of some of these, since, however, it does not appear to form an essential part of their organism. Consideration of this influence will be given in another connection.

In passing, it may be noted that lime is absolutely essential to animal life, the very frame-work of the animal has lime as its principal basic constituent, combined as calcium phosphate. So careful is nature to ensure the supply to the young animal that, as Bunge (13) has beautifully shown, the ash of dog's milk contains 34.4 per cent. of lime, that of the young animals body 35.8 per cent., while the blood-serum from which the mother's milk is prepared contains only 2.4 per cent. In the natural economy, therefore, we must regard the

(8) Sachs's *Leder*, *Ztschr.*, 21, 155.

(9) *Rep. Conn. Station*, 1899, 252-261.

(10) *Exp. Station Record*, 11, 163.

(11) *Jahresbericht f. Agrik-Chem.*, 1899, 197.

(12) *Op. cit.*, 192-4.

(13) *Lehrbuch des Physiologischen und pathologischen Chemie*, 97.

lime taken up by the plants, and especially by their leaves, as having a final use beyond the plant organism, in that of the animal browsing upon it.

Turning now to some of the uses of lime in the soil, let us consider in the first place, its power to neutralize acids.

Acidity may be caused in a soil by the oxidation of sulphide, such as iron pyrites; the occurrence of such acidity is principally confined to soils lying below certain exposed coal beds and to alluvial bottoms affected by the acid water from mines. Acidity is most frequently due to the presence of an excess of humus acids formed upon the decay of pre-existing vegetation; this excess may arise from the presence of a very large amount of humus in the soil, as in swamps and sometimes in forests and old meadows; or it may occur where there is no large amount of humus, but where the soil contains little basic material capable of neutralizing even the small amount of humus acids present. Hence both in lowlands where the accumulation of food supply brought by drainage from the surrounding hills has produced a heavier growth of vegetation, and where standing water has prevented its rapid and complete decay, and on uplands deprived of lime and other basic constituents by the very drainage that enriched the lowlands, may injury from acidity appear. The third cause of acidity is in the nature of the fertilizers applied; not only do acid phosphates tend to produce a slight acidity, but neutral salts, such as potassium sulphate and muriate, ammonium sulphate and calcium sulphate, whose bases the plant usually assimilates more largely than their acids, also give rise after a time, to a pronounced acid condition unless the soil contains a large excess of basic materials or unless fertilizers of opposite tendency, such as nitrate of soda or neutral phosphates are sufficiently employed.

Whatever the source of the acidity, most agricultural plants are injuriously affected by it. W. Maxwell (14) has recently experimented to determine the susceptibility of various orders of agricultural plants to an excess of acids. He used weak solutions of citric acid for the purpose. An excess of 0.1 to 0.02 per cent. of this acid in a soil quickly killed clovers and members of the mustard family, to which the cabbage, rape, turnip, cress and radish belong, while lupines, vetches and beans vegetated but produced no seed; wheat and barley were badly injured, and corn blossomed but did not ear. Pearl millet, on the other hand, seemed to prefer a sour soil and withstood the action of even one per cent. of citric acid. Other evidence on the same subject is presented in Bulletin 61.

Not only do our crops suffer direct injury from the presence of acidity, but fail also to derive the benefit of the full activity of the lower organisms inhabiting the soil. It is to-day quite generally

(14) Jahresbincht Agrix-Chem., 1888, 42.

known that plants take up most of their nitrogen supply from the soil in the form of nitrates; that the soil contains but a small fraction of its nitrogen in that state of combination at any one time, and that the comparatively inert organic nitrogen of the humus is steadily converted, during the growing season, by the acid of special organisms—the nitrifying bacteria—into the highly useful nitrates. Without the highest activity of these organisms, the maximum crops can not be grown. The immediate product of the acidity of the nitrifying bacterium is not, however, a nitrate, but nitric acid; to any considerable excess of this product, or of other acids, in the soil above it, the bacterium is highly sensitive, and when such excess has been produced, ceases its nitrifying activity. To secure the highest result of its working power it is therefore needful that the soil contains an excess of basic material with which the nitric acid can unite, as it is produced, to form a neutral compound. Lime, either as such, or as a carbonate, is most excellent for this purpose; a large excess of caustic lime is however injurious and sometimes fatal to the nitrifying organism. Heavy dressings of lime tend, therefore, to stop nitrification for a time; in the course of a year or two, the causticity of the lime having been destroyed by chemical action in the soil, nitrification again sets up with increased vigor. It might appear that nitric acid, being of powerful nature, could readily seize upon basic material present in the silicates, of which all arable soil are chiefly composed, and be thus neutralized, with the accompanying liberation of gelatinous silica, which is not known to exercise seriously injurious effects upon vegetation or micro-organisms; but, in fact, very weak solutions of nitric acid, though effective in their influence upon the nitrifying organisms, are unable to decompose the silicates. In general, therefore, the presence of an oxid or carbonate of the alkalines or alkaline earth, especially soda, potash, magnesia or lime, is needful to the best nitrification. Soils rich in lime are oftentimes deficient in calcium carbonate. F. Polzenick (15) found that one soil, containing 0.546 per cent. of lime soluble in 5 per cent. hydrochloric acid, held but 0.014 per cent. in combination as carbonate. This small proportion proved sufficient for the rapid nitrification of bone, but not for that of ammonium sulphate, since the sulphuric acid of this substance is liberated and thus adds to the acidity of the soil. Jenkins and Britton (16) found, however, that in working with the light soil of Connecticut, large dressings of lime considerably increased the availability of the nitrogen of bone, doubtless by a final increase in the rate of its nitrification.

Not only does lime aid, sooner or later, in the process of nitrification; it also greatly increased the rate of destruction of organic mat-

(15) *Jahresbericht f. Agrik-Chem.*, 1898, 165.

(16) *Rep. Conn. Agr. Exp. Sta.*, 1899, 211-216.

ter. This result is doubtless accomplished in part by the direct decomposing action of this powerful reagent upon the humus; but the principal destruction is probably accomplished indirectly by the increased activity of bacteria induced by the greater alkalinity of the soil. This power is highly useful in bringing the long accumulating store of food in old meadow lands and peat bogs and those of strawy and green manures into available condition; but carried too far, it leads to a great waste of fertility and a serious injury to the spongy texture of the soil. It is fortunately true, even where excess is used, that the non-nitrogenous materials are reduced more rapidly than the nitrogen, just as in the ordinary decay of humus; this was made clear in the experiments conducted by the writer and reported in Bulletin 61. Wheeler, Sargeant and Hartwell (17) have found the same fact in experimenting upon the effects of lime and gypsum upon the decay of humus.

There remains for brief mention several direct chemical reactions of lime with soil constituents. Its effect upon soil ammonia may first be noted. When the chemist desires to test a substance for the presence of ammonia, he tests it in a moist condition with caustic lime; if ammonia is present, it is liberated and can be detected either by its odor or its effect upon various coloring matters. Lime liberates ammonia from its soil compounds, in like manner, whether it be there contained with the acid of humus, with silica, or with the sulphuric acid of a fertilizer. The result of a gradual liberation is to promote nitrification and crop growth; calcium carbonate also attacks ammonium sulphate, forming ammonium carbonic and calcium sulphate. If excessive quantities of either ammoniac or ammonium carbonate are suddenly formed, a serious loss of these valuable constituents is quite possible.

Giustiani (18) found a distinct loss of nitrogen to occur when considerable quantities of ammoniacal fertilizers were applied to calcareous soils, least when such soils were also moist and rich in humus; but in the case of sands, even those containing 5 to 20 per cent. of lime, such fertilizers may be beneficial unless drought supervenes.

Lime likewise liberates potash from its combination with some silicates; for this reason, a small dressing of potash salts on soils already fairly basic, may accomplish as much good as a much more expensive application of lime.

Lime, whether in caustic or carbonated form, also reacts upon the iron and aluminum phosphates in the soil, phosphates that are with difficulty attacked by many plants, and combines with the phosphoric acid to form the much more available lime phosphates. Furthermore, in soils well supplied with lime, soluble phosphoric acid

(17) Jour. Amer. Chem. Soc., 21, 1032-7.

(18) Ann. Agron., 27, 862.

applied in super-phosphates is much less rapidly converted into unavailable form than where lime is lacking. It is not a very excellent practice to add caustic or carbonated lime to a fertilizer containing soluble phosphoric acid, before applying it to the land; for, by this process, the most perfect distribution of the phosphoric acid in the soil is prevented; a better plan is to lime first, then add the fertilizer. Nevertheless, when the latter method is impracticable, there are many soils in which the phosphoric acid will be more effective in crop production when lime has been added to the super-phosphates. Our own limestone clay soil on the experimental farm where there is much iron, is of this character. Patterson (19) reports the same thing true of the red soil of the Maryland Experiment Station. If ammonium salts are also present, the mixing should be performed just before the application; otherwise a serious loss of nitrogen will result. The writer received only a day or two ago, an announcement of a preparation of ground lime coated with fused nitrate of soda, to which the name "niterlime" was given. It is claimed that the nitrate will prevent any reaction between the lime and the ammonia and phosphoric acid of a fertilizer with which the niterlime is mixed; if that proves true and the new material can be cheaply made, it will obviate the chief disadvantage attending to a mixture of lime and commercial fertilizer.

Before passing to certain questions of practice, it remains to note the effects of lime upon soil texture. This topic has been so fully discussed in Bulletin 61, that the briefest statement at this point will suffice. Lime applied to a heavy, runny clay, that tends to puddle under the pressure of the horse's foot or that of the plowshare, will, if drainage has also been secured, change the texture so that the puddling is avoided, the land becomes more open and loamy, and does not break up into hard clods when plowed. To produce this effect, rather heavy dressings are needful. Calcium carbide, whether applied as fine ground limestone, leached wood ashes or marl, also acts in a similar manner, but far less effectively. Recent extensive experiments by Wolley (20) show that the carbonate leaves the clay much less open than the caustic lime.

On the other hand, lime tends to compact sandy soils and to make them more retentive of moisture.

There is little doubt that these physical effects upon soil texture are among the most important changes wrought in the soil by lime.

In conclusion, there are several practical questions often asked by correspondents, that more than most others deserve consideration at this time. What lime preparation should the Pennsylvania farmer use? Thoughtful consideration of the earlier statements in this

(19) Maryland Station Bulletin 66.

(20) *Jahresbericht f. Agrik-Chem.*, 1898, 69.

paper must show that the answer can not be the same under all circumstances. Many authorities assume that practically all the lime, however prepared, that comes into action in the soil, is, before it has had time to react upon the mineral or organic matters, converted to either a neutral or an acid carbonate; and that, therefore, the main question is upon the final state of sub-division of the carbonate. While such condition must eventually occur, the writer's experience does not permit the conclusion that the change is as immediate as has been generally assumed. Scientific experiment has shown the caustic lime far more active in amending stiff, runny clays. For this purpose, therefore, air-slaked lime, especially such as has been long exposed to the air, and thereby largely converted to calcium carbonate, is not to be commended. Ground stone lime and finely powdered, water-slaked lime packed in barrels, are now extensively advertised. A patent has been taken out for slaking lime, piled on a slope and covered with a layer of air-slaked lime, it being claimed that by this process a very finely divided, carbonic acid-free slaked lime can be obtained. No doubt these excellent products can be advantageously employed in many regions remote from cheap lime; but carefully water-slaked lime, home prepared from most of the limes so readily found in middle and eastern Pennsylvania, will probably be found more economical for farmers of these localities. This much should possibly be said for the ground limestone, that Patterson (21) found from five years' trial, that lime slaked in the soil gave a larger return than that slaked before application. He also found that weight for weight, shell lime and stone lime were equally efficient, despite a common impression to the contrary.

Where the correction of acidity, the promotion of nitrification or the prevention of undesirable reversion of phosphoric acid is sought, doubtless the carbonate will be as valuable as the caustic lime, if it can be cheaply sub-divided and thoroughly distributed; in fact, however, burning and air-slaking is the cheapest process of preparing a very fine carbonate of lime. The question assumes especial importance in case of sandy soils, whose humus supply is, at best, rather low, and whose water-holding capacity is largely measured by the humus it retains. On such soils, unless the dressings are very light, finely divided carbonate forms are to be preferred.

The writer has repeatedly urged, on the score of safety and economy, the use of smaller dressings of lime than are usually applied, excepting those cases in which the character of a runny clay is to be changed. Fleischer, (22) after a large experience with moor lands, similar in many respects to the peat beds so many enterprising farmers in northern Pennsylvania are preparing for onion and celery

(21) Loc. cit.

(22) Jahresbericht f. Agrik-Chem., 1898, 136.

culture, states that lime applied to such lands in excess produces an encrustation of the surface that is highly injurious to vegetation, and that is almost impossible to remove, even by deep plowing and heavy manuring with stable and green manures. Patterson(23) found that taking into account the crops for four years after liming, 20 bushels gave a more commercial return than 60 bushels, and that even 10 bushels gave excellent returns.

The question of the value of magnesian limes assumed a new interest from the investigations of Loew and May. Most soils give up to strong acid, such as is used in soil analysis, more magnesia than lime; it is not safe to assume from this fact, that the plant will take up more magnesia than lime from such soils. Theoretical considerations indicate that magnesian limes, or soils deficient in available magnesia, would be more beneficial than pure lime; that in other cases, the lime present being sufficient to counteract any poisonous action of an excess of magnesium salts in the plant, the substitution of lime by magnesia is a matter of indifference, since most of the chemical functions of lime in the soil can be performed by magnesia; while, in a third class of cases, where lime is relatively deficient in the soil, even magnesium carbonate might act as a source of poisonous magnesium compounds in the plant, and magnesian lime be therefore inadmissible. Aside from these theoretical considerations, based upon relations the farmer has no direct measures of determining, the fact that magnesian limes remain caustic in the soil much longer than pure limes makes greater caution necessary in their use, except when applied to very acid soils; such as old meadows and swamps.

The facts thus set forth establish the truth that lime is a reagent of many uses on the farm, and that its employment can not be governed by any simple rule. The farmers of other States have exhibited surprise and even amusement at the importance the Pennsylvania farmer attaches to this material, and query why it is needed in Pennsylvania and not elsewhere. It is probable that some Pennsylvania farmers have overestimated its value as greatly as the farmers of other localities have underestimated it. It is interesting to note in recent times the statement by Wheeler and Tillinghast (24) that its use on the acid granite sands of Rhode Island has resulted in a net profit, in four years, of \$27.95 to \$62.35, average \$45.10 per acre; by Georgeson (25) that lime has greatly improved the acid soils of Alaska; by Burkett (26) that it has given largely increased returns on old meadow land in New Hampshire; and by P. Hillmann (27) that

(23) Loc. cit.

(24) Report Rhode Island Exp. Station.

(25) Bulletin 82, Office of Exp. Station, U. S. Dept. Agric.

(26) Bulletin 59, New Hampshire Agr. Exp. Station.

(27) Moeth. deutsch. Idw. Gesellsch., 16, 256 seq.

co-operative experiments show a very general need on German farms for lime, benefit being observed in some heavy soils that contain as much as 0.5 per cent. of lime.

CARE AND MANAGEMENT OF ORCHARDS.

BY PROF. R. L. WATTS, *Scalp Level, Pa.*

The care and management of orchards is a subject of growing interest to the farmers and horticulturists of Pennsylvania. The demand for choice fruit is rapidly increasing and there seems to be no danger of an overproduction of fruits of superior quality. Only a few years ago fear was expressed that the supply would soon exceed the demand, and, consequently, that orcharding would prove unremunerative. But has not this fear been entirely expelled? Is not the fact well known throughout the State that, with the increase in population, with the development of great commercial enterprises and with more cultivated tastes there will always be a keen demand for the best fruits?

Buyers of any commodity always seek the best and the best commands the highest price. Then, the first aim of the fruit grower should be to produce the best, and the second aim should be to produce the best at the lowest cost. A thorough knowledge of the underlying principles and ability to apply them will insure success so far as quality and quantity are concerned, but an understanding of principles and ability to apply them do not, by any means, insure financial success. To make fruit growing profitable, executive and business ability is necessary. It is one thing to produce fine fruit and quite another to produce it economically and to dispose of it to the best advantage. The fruit industry of to-day needs men who are well trained in the sciences relating to fruit culture as well as in business methods.

Most of the old orchards of the State are not satisfactory in a commercial way. No doubt it would be possible to restore many of them to profitable bearing, but the establishment and maintenance of new orchards are receiving more attention and, therefore, my paper will relate especially to this phase of the subject.

In selecting a location the soil is of primary importance. Its physical and chemical properties should be carefully considered. If climatic conditions are peculiarly favorable, the soil can often be altered so as to secure satisfactory results. An example is furnished

in the White Pines district of North Carolina. This district, which is gaining considerable reputation for the production of grapes and peaches, has a sandy soil, which, even in its virgin state, does not contain available plant food sufficient to produce satisfactory wood growth or a good crop of fruit. The soil, however, affords a perfect medium for the foraging of roots, and by the intelligent use of artificial fertilizers, it has been made to yield fine returns. It is generally advisable, however, to select soils affording the greatest number of desirable properties.

Sandy soils should be avoided because they are usually wanting in the elements of plant food and they are not retentive of moisture or fertility. Clayey soils are hard to cultivate, bake easily and are often deficient in available plant food. Distinctly loamy soils produce a weak, brashy growth because of too much moisture and an unbalanced ration of plant food, in which nitrogen predominates. Such soils are generally improved by the addition of potash and phosphoric acid. The ideal soils for general fruit growing are the clayey and gravelly loams; these soils afford excellent mediums for root development and are retentive of both moisture and fertility. Such soils produce strong, healthy wood and fine fruit.

The orchard site should be higher than adjoining lands to secure atmospheric drainage. The cold air, being heavier than warm air, settles on lower lands, frequently causing frost when there is none on the adjacent higher areas. At my home in Cambria county, it is common to have frosts in the valley a week to ten days later in the spring and that much earlier in the fall than on hill sloping towards the creek. A frost of recent date did considerable damage to fruits along this small stream, while on southern slopes less than a quarter of a mile distant, practically no damage was done to the tree fruits.

There is great diversity of opinion regarding the proper aspect or exposure for orchards. Some contend that a northern slope should be selected while others prefer land sloping to the south. The slope selected must be determined largely by the prevailing high winds. Northern aspect is all right for the tender fruits which bloom early in the spring, provided there are natural or artificial windbreaks. If windbreaks are not present the trees will likely suffer winter injury. A southern or southwestern exposure has four marked advantages. First, fruit trees profit as much by the early morning sun as do greenhouse plants. With soils equally fertile, trees on land sloping to the south make a more rapid and healthy growth than those planted on northern slopes. Second, the fruits ripen earlier, which is an advantage with all fruits excepting some winter varieties. Third, fruits produced on southern slopes are superior in color and quality. Fourth, trees on southern slopes do not, as a rule, suffer as much from destructive winds, and consequently they grow

straighter, fewer limbs are broken when laden with fruit or snow, the number of windfalls is smaller and the evaporation of moisture from the soil is reduced.

The matter of windbreaks to protect fruit plantations in the east has received too little attention. There are many orchards protected by natural windbreaks in the way of hills and woods that render artificial windbreaks unnecessary. But the establishment of compact windbreaks would prove profitable to many orchardists. Not having used them extensively it is natural to underestimate their value. Good windbreaks protect trees from cold, reduce soil evaporation, lessen windfalls and breakage of trees and limbs, retain leaves and snow on the ground, thus affording better protection to the soil, make labor pleasanter in the orchard and protect blossoms from severe winds. Probably the best and most effective tree for windbreaks is the Norway spruce. The trees should be planted three or four feet apart and given good care until well established. It is thought by some that trees planted eight or ten feet apart make a more effective and permanent hedge. No doubt the greater distance favors a larger and more perfect development of the trees.

Too much care cannot be exercised in preparing the land for the orchard. It should be plowed deep and sub-soiled, if the subsoil is very tenacious. The most thorough, deep pulverization should also be practiced which will make the proper medium for the roots, increase the amount of available plant food and the capacity of the soil to absorb and hold water. This preparation must last for years, and therefore it should be most thorough.

For the most profitable returns more attention should be given to the propagation and selection of trees than is customary. The usual method of purchasing through agents or direct from nurserymen who propagate wood chosen indiscriminately is certain to prove only partially successful. Fruit growers will never secure the best results until they apply the laws and principles of plant breeding. Laws and principles relating to stock breeding have long since been recognized. Men have been enabled to breed better stock and to make the breeding of first class stock more certain because of this recognition. But breeders of fruit trees are far behind stock breeders in the intelligence with which they operate. It is well understood by stock breeders that animals have an individuality and that the character of the offspring is largely determined by the parentage. The breeder of high grade stock of any kind seeks a parentage of the finest type. He follows a careful system of selection, breeding the best in each generation with the knowledge that his stock will gradually but certainly improve and profits increase. The stock breeder desiring to build up his herd and to increase his earnings would not think of breeding stock the pedigree of which he is ignorant. The breeder of

poultry wants to know whether the mother will lay two hundred eggs in a year and what proportion of her eggs, if hatched, will produce roosters. But not one nurseryman or fruit grower in a hundred gives the question of parentage any thought. The orchardist is fully satisfied if he gets good strong trees of the varieties wanted. If he orders Baldwins and Baldwins come, they are planted and he waits years for uncertain results. Every observing fruit grower has noticed that no two trees of a given variety growing under exactly the same conditions are ever alike. They may have been of equal size when planted, placed side by side in soil of the same properties, cultivated and treated in all respects just alike, but if their character is studied and their history reviewed when they are twenty-five years old, many differences will be discovered. The trees are different in habit of growth; some have fruited quite uniformly every year, while others have borne every other year or less frequently. Some have yielded larger fruits and more of them than others. Now, if a orchard were to be propagated from such an old plantation would it be judicious to cut scions promiscuously from all the trees without reference to their habits of growth or fruiting qualities? This question must be answered in the negative for it is a well established fact with plants as well as with animals that "like tends to produce like." If we want the most profitable orchard we should propagate from robust trees which have yielded the largest and the greatest number of crops of the finest fruit.

Most nurserymen do not pay any attention to the individuality of the stock they multiply. Unless our nurserymen, therefore, change their methods and propagate and sell pedigree trees, the practical fruit grower must propagate his own trees or top work nursery trees in order to secure satisfactory results. Perhaps the best plan is to procure trees of a healthy vigorous grower like Northern Spy and top graft after they have been transplanted one year, with scions from trees or stock of known value.

There is a difference of opinion regarding the best season to plant the orchard. Some believe that it is better to plant all kinds of fruit trees in the spring, but for hardy fruits, as the pear, apple and plum, fall setting has several advantages. Trees transplanted in the fall become firmly established by spring and consequently growth begins earlier, and this earlier and more vigorous growth enables the trees to withstand summer drouths better than those set in the spring. When fall planting is practiced, precaution should be taken that the wood of the trees is properly ripened. Some nurserymen strip the leaves before the annual growth is complete and the trees are then placed on the market early in the fall. This denuding of foliage weakens the trees and doubtless causes the loss of many. Another advantage of fall planting is that the orchardist is not usually so

busy at this season and he will likely exercise more care in preparing the land as well as in setting the trees than during the rush of spring work.

The fertilizer question in its relation to orcharding demands more thought and attention. Three elements must be considered, namely, the needs of the tree and fruit as determined by chemical analyses, the needs of the particular tree under cultivation as indicated by the character of leaf, wood and fruit, and the chemical composition of the soil which is being cultivated. Having determined as nearly as possible these three questions, and with a knowledge of the functions of the elements of plant food found in fertilizers, the grower is prepared to nourish his trees intelligently and in a way that will result in a sturdy, healthy leaf and wood growth and fruit satisfactory in yield and quality, provided other conditions are favorable.

Perhaps too much importance has been placed upon the use of potash. Many fruit growers believe that potash is the one element needed and that liberal applications of it will generally secure the desired results. The question is frequently asked or implied at farmers' institutes, "Do my trees need potash?" While it is seldom that a fruit grower inquires about the use of nitrogen for his trees. If the orchardist possesses a knowledge of the effects of potash and nitrogen he will secure more reliable and certain information by asking the trees what they need than by quizzing the best informed institute workers who have never seen the trees in question.

No doubt thousands of trees in our State do not make leaf and wood growth sufficient to produce large and regular crops. There must be leaf and wood before there can be fruit. It is nitrogen that plays the most important part in the development of wood and foliage, while potash is employed most largely in the fruit. The exclusive use of nitrogen should not be advocated any more than potash alone. But liberal applications of stable manure (which is rich in nitrogen) or sodium nitrate, with fair quantities of potash and phosphoric acid, would undoubtedly prove more valuable in many orchards than potash alone. The Massachusetts Agricultural Experiment Station has found that sodium nitrate is more efficient than stable manure when applied to orchards in sod, because the nitrate is in an available condition as soon as dissolved and penetrates more quickly and thoroughly through the surface soil than the nitrogenous compounds of stable manure. The question of orchard fertility is purely a local one. Diligent study and close observation will enable the grower to determine the proper proportions of the elements that should be applied artificially.

The orchard is too frequently considered of secondary importance. The land is devoted to hay or grain and no fertility is returned. Such a plan must be condemned because it is unsatisfactory for both

the general farm crop and the fruit. Another plan which is also common is to cultivate hoed crops between the trees while the orchard is young. This plan may be recommended while the trees are young, providing tillage is thorough, plants are not grown within the feeding area of the trees and that the fertility of the soil is maintained so that the trees do not suffer from the want of nutrition. As the orchardist is working for economical production, this method meets with his favor, especially on land that is comparatively level and well adapted to vegetables or other low crops that need cultivation.

A plan which is gaining in popularity is to begin tillage early in the season, cultivating over the entire surface and continuing until the cessation of active growth. The land is then sown in cow peas, crimson clover or other cover crop which will protect the soil during the fall and winter, and lessen root injury from hard winter freezing. This plan meets the approval of the most up-to-date and progressive men. It secures all the advantages of tillage and if legumes are used for cover crops the supply of nitrogen will be maintained in an economical way.

A more feasible method for lands which are very steep and in danger of washing, or too rough, stony or stumpy to cultivate readily is to grow grass, mowing once, or better twice a year, and using the hay as a mulch about the trees. If this plan is adopted special care should be exercised in preparing the soil. The holes should be large and the soil well pulverized and enriched before setting the trees. Mulching has much the same effect as tillage and the cost is less. With proper pruning, spraying and fertilizing this method would prove successful on many lands in Pennsylvania which are now yielding the owners practically no returns.

THE FARMER AS A MANUFACTURER OF MILK.

BY DR. LEONARD PEARSON, *State Veterinarian.*

The farmer is by far the largest manufacturer. Here in Pennsylvania we feel that we are in the heart of the greatest manufacturing district in the world. The State is studded by sets of equipments commonly known as "plants"—dull, sombre, dirty "plants" many of them are—the food of which is iron ore, limestone and coal, all dug from the ground, and the fruit of which is iron and steel. The opera-

tors of these plants, with their simple needs and products and their coarse chemistry, are not more truly manufacturers than those who nourish and care for God's green plants with their manifold and complex needs, their delicate, subtle chemistry, and their fruits that make the heart glad.

We are sometimes asked the apparently difficult question: Why does the same food given to different animals produce in one case beef and in other cases energy, pork, milk, wool or eggs? The answer is plain; it is because the animal machines differ. No one asks why wood fed to one set of machines come out flooring and from another shingles, boxes or paper, for it is manifest that the machines differ.

The farmer as a manufacturer, making milk, by passing through an animal machine such materials as corn-silage, hay, oats and bran, has gone further than most manufacturers, because he not only made the raw materials but he has also made the machine that turns out the furnished product, milk. He designed the machine, he furnished the raw materials entering into its composition and he controlled and guided the forces that erected it.

I have drawn this parallel between those who are commonly known as manufacturers and farmers, for the sake of drawing another to show wherein farmers and manufacturers differ in their ways of disposing of the products they have produced.

The makers of products of steam driven machines do not as a rule wait for their customers to discover the merits of their wares and come for them. They take good care that the advantages of their products shall become known and they are brought to the attention of consumers. This manufacturer creates the object and the interest and the use that make a demand; then he proceeds to supply the demand. Farmers do not often create a demand. Their customers establish the demand and the price, and they meet them if they can. The exceptions to this rule are in the highest grade products, as pure bred animals, horses of exceptional qualities, seeds, special grades of butter or fruit and certified milk; special things, sold with a name. In respect to the bulk of farm products the rule holds and prices are not controlled by the producers.

Now it occurs to me that in respect to milk, this practice might profitably be changed. The producer has here a food product of exceptional value that is used to a much smaller extent than its merits justify and that is partly displaced in the market by more expensive and less nutritious things.

If a manufacturer is to push a product, he first informs himself in respect to its merits and the place it is to occupy and then studies the things he proposes to substitute it for. He also adapts himself,

his methods and his product to the market demands. If his customers express a desire for his product in a different form, their preference is as law.

Now, to apply these principles to milk, let us consider the value of the milk as food and the forms in which it will be most attractive to consumers.

Foods supply a variety of needs in the body. If we continue our parallel of the animal body and the machine, we may say that foods supply through their protein (1) material for building or growth and (2) for repairs; that is, for the restoration to the economy of substances exhausted by use; through their carbohydrates and fats they supply material, (3) for consumption as fuel, to provide energy and to keep up the temperature and (4) for storage, as fat, to be used at a future time.

A perfect food contains all of the various classes of substances for these different uses combined in the proper proportions and in a form that is convenient and pleasant for ingestion and easy of digestion.

For the infant or young animal there is no single food fulfilling the indications to an extent that makes it at all comparable to milk. And even for the mature person, or animal, there is no single food combining within itself all of the essential food elements in such appropriate combination. It is not proper, however, to speak of milk as a perfect food for adults because the nutritive ratio is not precisely that needed by adults and milk is so bulky that an inconveniently large volume must be consumed to furnish enough food, if it is used alone. But milk may be used largely in the mixed diet of adults without increasing the bulk of the material placed in the stomach and with effect of cheapening the ration and making it more palatable and digestible than are usual.

To determine the value of milk in a dietary and whether it would serve as a substitute for proteids from other sources, Professor Jordan made some experiments at the students boarding house at the Maine State College in 1895. He found that "the free use of milk did not increase the gross weight of food eaten. The extra amount of milk replaced other animal foods to a nearly corresponding degree. The actual quantity of water-free nutrients eaten, diminished rather than increased when more milk was supplied. The increased consumption of milk had the effect of materially narrowing the nutritive ratio of the dietary, which he considers a desirable result, in view of the recognized tendency of Americans to consume an undue proportion of fats and carbohydrates. He also found that the dietaries in which milk was more abundantly supplied, were somewhat less costly than the others and at the same time fully as acceptable." He concluded that "milk should not be regarded as a luxury, but as an economical article of diet which families of mod-

erate income may freely purchase as a probable means of improving the character of the dietary and cheapening the cost of their supply of animal foods."

But milk is not appreciated and used to the extent that it should be, partly from lack of information, but largely through the fear of consumers that it may not have been produced under as good conditions as should prevail. While it is true that the large majority of dairymen are careful men who supply a high class product, there is a small minority who have no regard for the standing of their calling or for the rights or health of their customers and are devoid of personal honor. It is such men who injure the whole milk trade. They are found among dealers as well as among producers, and while perhaps they are not numerous they are still plentiful enough to detract largely from the results of the good work of careful men.

That the consumers appreciate a guarantee of wholesome conditions governing production and shipment may be seen from the fact that large milk businesses have recently been built up on the basis of furnishing consumers satisfactory proof of such conditions.

Better prices for milk are necessary to material improvement in the supply. But there are dealers who are willing to pay a higher price for better milk. The best class of dealers tell me that they have more trouble in finding dairymen who will furnish a satisfactory product than finding the means to pay a cent or a cent and a half bonus above the market price. I know of a dealer in Philadelphia who is anxious to pay five and a half cents a quart for milk that will come up to his standard of cleanliness, which is by no means unreasonably high, and he can't find a sufficient supply.

The two methods for improving the general milk supply are the voluntary and the compulsory. Under the voluntary method dealers guarantee a certain standard and their business integrity rests on the maintenance of the standard they promise. To secure the co-operation of producers they have to pay more than the usual market price. Again, voluntary milk commissions are established in some cities to examine and certify to the quality, wholesomeness and cleanliness of the milk furnished by certain producers. The certificate of this commission carries with it such a business advantage that considerably more than the market price can be charged for the milk covered by it.

These voluntary methods for improving the milk supply, have the great advantage of carrying with them increased price. In other words they encourage the careful producer and compensate him for his extra work. This is right.

The compulsory method on the other hand, aims to compel the observance of a certain standard, but does not, except directly, improve the market of those who surpass this fixed standard. The voluntary

method rewards those who reach a high standard; the compulsory method punishes those who fall below it. It appears to me that the two plans may be harmonized and used together, although independently.

While a strong movement is on foot to provide a better market for the best milk, should not means be taken to improve the dairies of the lowest class that are holding down the average quality of milk and the price as well? Since milk is not usually sold in such a way as to carry with it the name of the producer, as a trade mark, a purveyor of milk carrying germs of filth or disease injures not only his own customers but he injures the general market by causing fear or disgust and thus he hurts all producers.

I suggest to you the need for a minimum standard to govern milk and the conditions under which it is produced; a standard that can easily be reached, one that is now not only reached but is surpassed by the great majority of producers, but one that will afford a reasonable protection against dangerous conditions and re-establish and increase confidence in this valuable food and most important product of the farm..

EDUCATION FOR COUNTRY CHILDREN.

BY MR. J. S. BURNS, *Clinton, Pa.*

We have reached a time in our history as a people when the illiterate and uneducated can no longer cope in the great struggle of life. The time was when it was thought that a farmer did not need much education; but we are glad that this idea is fast being dispelled, and that advances are being taken with a view to raising him to a higher plane of intelligence and excellence. The time has come when the country boy, if he be a winner in life, must have an even start, and stand upon equal footing, from an educational point of view, with that of his urban cousin. And having this even start he will be the winner, because reared in the country in the midst of health-giving environments, and where his inventive powers and his good practical common sense is ever being brought into active service, he will be endowed with that brain and brawn so notable in the country boy, thus giving him that pluck, energy and force of character, so often found among the great men of the land. For it is a noteworthy fact that some of the brightest intellects of which the professions, or this nation can boast, have had their origin on the farm.

Then the question very naturally arises, how can our country boys and girls get this needed qualification for an even start in life? We

find the public school education of the present day does not meet these requirements, and our country youth go in quest of better educational advantages, often at an expense beyond the means of their parents; and not only so, but as a result, they become alienated from home and country life. There is so much being said about the boys leaving the farm, and is it any wonder, when the whole trend of his education is calculated to lead him away from it? And now it is not our purpose to advocate keeping all the boys on the farm; but we would, if possible, frustrate this indiscriminate leaving of the farm, caused by the excitement and fascination of city life, before the character and good judgment has been sufficiently ripened to make a judicious choice of a calling in life.

And we believe centralization is a step in the right direction. Under an act of the Legislature, May 25, 1901, by a vote of the people, the school board may abolish district lines and establish at a convenient point, a central school, including, if necessary, a township high school, and provide for the transportation of the pupils to and from this central school. This we regard as the wisest piece of legislation in recent years; and we believe it will gradually lead to the abandonment of the ungraded district school, with its bleak surroundings, poor equipments, and unsanitary conditions. But reforms come slowly, and we can scarcely hope for a sudden or radical change. Nor would we think it prudent to do so, but it should be done after the most careful deliberation that no mistake be made as to location. Through centralization, we believe that equal educational advantages with that of the city, will be placed within reach of our country children, and at the same time have them enjoy all the desirable advantages of rural life.

In many sparsely settled districts we find even less than ten pupils, making the individual education expensive; even more so than it would be under the centralization and transportation system, and then there is a lack of vim and excitement caused by rivalry in class recitations. Very fair examples of this can be found in my own township.

Prof. Kern, of Rockford, Ills., after an exhaustive investigation of the centralized schools of Ohio, says "Centralization will decrease the cost per capita for education, give longer school terms, and furnish a more efficient teaching force at better salaries." He says, "the daily average attendance is so increased that from 25 to 35 per cent. more schooling can be had in a township. And the poor man who has been able only to send his children to an ungraded district school, can have the pleasure of seeing his children enjoy the best education a township can furnish at a less cost per capita to his rich neighbor than heretofore."

Hon. A. E. Palmer, of Michigan, says, "In Madison township, Lake

Co., Ohio, centralization is no longer an experiment, but has come to stay." He says, "In one of the centralized districts, which was originally three districts, the roads are very bad, heavy grades and sticky clay, yet but one trip was missed during the term of 1901, by one wagon, and that on account of snow drifts." He further says, "Previous to centralization there was an enrollment of 21 pupils in the three districts, or an average of seven; at an annual cost per capita of \$45.00; while under centralization, there is an enrollment of 35, and a per capita cost of \$15.50. The distances in this township ranged from two to four miles; and the average cost per wagon per day was \$1.30; and an average load of 15 pupils."

Much more could be quoted from the reports of many different investigators, but we think this is sufficient to explode the oft advanced arguments that centralization will increase educational expenses; and that transportation is impractical on account of the condition of our country roads. The same arguments was heard in opposition to Rural Free Mail Delivery, yet experience shows it can be done. And it is our honest conviction that centralization should have the most careful consideration of every citizen who has the best interests of the rural population at heart. Any thoughtful person can readily see that by the consolidation of several schools into one central school, that a better classification of the pupils can be had, and two or three teachers can thoroughly do the work of a half dozen under our present system. And as a consequence, an increase of wages can be paid and better teachers secured. Then by centralization, and a better classification, new and more important studies can be introduced, and more attention paid to the common branches, which so many have to make practical use of every day of their lives. What is more humiliating than bad writing and incorrect spelling? And we are able to conceal almost any other part of our incomplete education better than these. If we have any communication with our fellow men other than verbal, we must use our pen or our pencil; and in the same connection the standard of our orthography is made public. And it matters not how neatly written an article or letter may be, incorrect spelling will overshadow its beauty. And even though every word be correctly spelled, a miserable scrawl will mystify our proficiency in this line. And how many people there are who are not capable of writing a real business-like letter. Chicago merchants have complained that they cannot secure clerks who can properly write and spell a letter in the English language. And many hundreds of young men and young ladies, when they have thought to have completed their education, are not capable of writing an explicit, yet concise composition.

Then if our boy expects to be a farmer he must have a knowledge of the works of nature and its intimate relationship with his sur-

roundings in everyday life. He will be compelled to deal with natural things. His pleasure as well as his livelihood, will depend upon a knowledge of the laws of nature. And every encouragement should be given to the development of a practical knowledge of trees and plants, animals and insects, and of rocks and soils. His powers of observation should be cultivated as well. He should be required to give a comparison of scenery as he travels from one point to another, or on his route to school. A knowledge of the natural things of life and of home surroundings would tend to implant a germ of pride which would be more lasting than life itself; because evidences of it would be manifest in the home, and its surroundings, when the man himself had gone to his last reward. A study of the many curious formations of nature and their ultimate meaning would tend to strengthen that recognition of a Higher Power so innate to the human soul, and thus form a worthy citizen and an humble Christian, as well as a logical thinker.

How many of us farmers and country people have any knowledge of the intricate formation of the most common things with which we have to deal every day of our lives? I speak from experience when I say I now realize what an education of this kind would be to me in the pursuit of my calling.

But we can scarcely hope to have studies of this kind introduced and taught in our public schools to any considerable extent, owing to the crowded condition of the curriculum. That training which is essential to the needs of the farmer can scarcely be had under existing methods. And whilst centralization would overcome these obstacles, and make room for all, yet we think a few things could be lopped off with profit. We can scarcely see the propriety of our boys and girls being able to give the exact history and geography of foreign countries and lands, and at the same time be ignorant of the cause and effect in the most common things of life.

A lack of qualified teachers is an argument that is often advanced in opposition to a change such as we have suggested. But let us have the system and the teachers will be forthcoming. It may cause a few of the less efficient ones to seek other employment; for the facts are, there are a few who are not highly qualified to teach even the common branches referred to above, that of writing and spelling, especially the former, because it has been so neglected in their own education. And they are not nearly so much to blame as the institution which tried to fit them for their profession. And again there are those who are highly qualified from an educational point of view, yet they lack proficiency in government as well as a lack of ability to impart their knowledge to others. Yes, in this, as in all other professions, there are a few who have mistook their calling. And we wish the faculty in every institution of learning, in this broad land,

could have that keen power of observation which would enable them to read that natural, inborn, God-given qualification which every boy and girl has for some particular calling in life; and then have the good judgment to direct these inclinations in the proper channel, and there would be fewer failures. And if our boy's inclination is to be a farmer, by the aid of a superior education, he will magnify his calling and give honor and dignity to it. It has been said that it is not possible to estimate the value of one wide-a-woke up-to-date farmer in a community, and if this be true, and it certainly is, then what would be the standing of a community where all are of this type, or even the half of them? because we will scarcely find a locality where all are up to an ideal standard of the times.

We doubt if in all this broad land there is a single rural home where some little appliance or convenience could not be added. Things which in themselves are inexpensive, yet would add much to the comfort and convenience of the inmates. Their absence is often more the result of thoughtlessness than the want of funds. And they will be in greater evidence in the future, because the coming farmer will be more thoughtful. As we said the demand is for a more highly educated farmer; and thoughtfulness is the outgrowth of education.

And he will not only be educated and thoughtful, but he will be a scientific farmer; and understand the composition of soils, and the marvelous intricacies of plant growth and plant life. A new world of beauty and grandeur will be unfolded to him through a study and a knowledge of the works of nature and her wondrous beauty. And from a knowledge of these things he will be brought into more intimate relationship with Nature's God; because everything in nature represents something spiritual. This world of natural things is from Him who has all power, and he gave them, not solely for his own glory, but for the happiness of man; and the grand temple of nature will be explored with reference to its teachings of spiritual things.

And whilst the progress and development of the past century, especially the last half of it, have been so marvelous in their nature, yet there are greater things in store for the future. And those who will see the close of the first half of the 20th century, will look back with as much amazement upon our present methods of education as we now look back upon that of our grandparents' days. Methinks I see the advantages of a higher education granted to every boy and girl who has the desire and ability to receive it. I see each township send forth young men and women better qualified to fight life's battles. And I see the people take greater pride in their public schools.

THE FARMER'S EDUCATION.

BY MR. W. F. McSPARRAN, *Furniss, Pa.*

Before a man will seek a thing he must have a sense, at least in a general way, of its importance and value to him as an individual. In his quest for the thing desired, if he shall succeed, it is highly important that the seeker for anything of value shall have a foundation of character, stability and steadfastness of purpose that shall be to him an earnest of success.

To any farmer of mature mind or to any other student of the economic conditions and requirements surrounding our occupation as soil tillers, no argument need be brought to prove the proposition that we need in our business and for the elevation of our lives all the education we may get, but what shall we do with the man who rejoices in his ignorance as an inheritance from his father, kept unchanged through many generations? If this man had kept pace with the changing conditions that have made his business grow away from the one time scanty needs that were supplied by the then best available knowledge that we now call ignorance, there might be a hope that he would come to realize for his children at least the need of more education.

In no wise or manner do I give expression to any thought that fails to honor the good men and true who did the early work of our farming. They builded the houses, cleared and fenced the lands, and pitted their strength and endurance against the wildness of the wilderness. They met and withstood hardships and privation and walked fairly in such light as they possessed. But for the farmer of to-day, with the new light all around him to boast "thus did my father," is not so much an honoring of the sire as a lamentable evidence of the degeneracy of the son.

I know there is a season of seed-time and another of harvest, and that large crops require long seasons, but so much seed of this educational sowing seems to fall on such unkindly ground that we may doubt if it shall ever germinate. It may show up in seventeen years like the locust, and like it be split in the back.

A man will never get an education if he does not read books, and the love of books and a taste for reading them, and the power of understanding them are largely attributes of heredity. If a lack of appreciation of books and intellectual attainments shall have become a fixed type in a family, unless there shall be what we breeders of

animals call an out-cross, efforts to implant book love in the pedigree can claim no assurance of success.

This topic of mine is one that has been very widely and thoughtfully discussed, but I don't think that any of us who are responsible for its discussion have even been able to authoritatively announce just what this education of the farmer shall be.

For myself, I claim he should be, by reason of the multitudinous needs of his business, the most comprehensively and the most thoroughly educated member of society. His business covers so many lines to the special study of each one of which men of trained minds are devoting their lives, and it is not to be supposed that the busy working farmer can master all the minute details of each one of these subjects, but it should be part of his education that he be able to grasp the fundamental principles of each one relating to the different branches of his farming. And further, this education should show a willingness to take to himself and use all the important matter that these men of special study and research shall bring forth for his information and use.

Collateral to this willingness to use what is scientifically brought him should be a discriminating judgment that may serve him in eliminating theory from fact and false from the true. It does not follow that because some teacher announces a thing that that thing is true, for there have been false teachers and men of one wrong idea since the earliest history of the race. This contemplates that the ideal farmer shall have a technical knowledge of his business as the best equipment for the most profitable conduct of that business, but through me as spokesman, it does not contemplate that he shall be induced to acquire this technical knowledge merely because by its possession he shall be able to make more money.

That the making of money is important and laudable and worth striving for I shall not deny, but as the mainspring of all man's endeavor, I cannot but regard it as unworthy the educated farmer. This ideal farmer's education will embrace the uses of money for the comfort, education and elevation of his family, for the beautification of his home, the enlargement of his own usefulness and the uplifting of the dignity of his business.

Furthermore, his education shall embrace a knowledge of good government as affecting all the governed, for the time might come—I am no prophet, and don't pretend to say it will—but the time might come when he will be called to fill some high office, we will say as Governor of his State, and he must not be found with no oil in his lamp. When we meet men of other callings or professions away from their places of business they carry no ear-marks by which a stranger may determine their occupation, and I see no reason why the farmer should not mingle with any body of business men, without

identification either by his manner or his conversation. To meet this cosmopolitan requirement he should be a man of a liberal education, posted on the affairs of the world and in matters of doubt be able to express in good plain English the opinions he has formed, and with all this should be the refined pride that every well balanced man should have in his occupation. When occasion requires him to speak concerning his work, he should never lower his voice to say "I am a farmer."

It is possibly late to ask the question, "What is education? As far as I have been able to find a short definition for it, it is the ability to think, and think logically and correctly. There is a wide difference between education and information. A man with only a memory may gather up in these days of statistics and reports almost any amount of information, but if he do not have the educational qualifications to use the information, he has nothing, in truth, but rubbish and lumber. What is of vast use to the trained thinker, to the other is nothing but vanity—riches washed up by the sea to Cronsoe.

After the student has learned to think and he shall be industrious and thorough, then all the education of the world is at his command. Let him not lament that he is too old for the schools or that if he is younger he has not the means to avail himself of the help and usefulness of the schools and the association of trained men. Men know nothing that is worth knowing nowadays that is not in books or that does not pretty soon get into the books, and if the learner should go to the schools he would be taught from the books.

I know that association with and the conversation of good and wise men is educational and a great source of inspiration, but the listener must bring to the talker a keen ear and an attentive one and a comprehending understanding. I say nothing but good for good schools. Our country public schools have been the seed-beds of the flower and the glory of our nation, but I believe that many a young man is having the whole trend of his life changed from usefulness at some high institution of learning during the most critical period of his life, ranging variously from the time he is eighteen to twenty-five years old, when otherwise he might be mastering the important first principles of some life vocation, that in the hopeful days of boyhood would hold such winning attractions and that to the college man of twenty-five would be "flat, stale and unprofitable."

The ambition that is fruitful usually germinates early in the springtime of life, the later varieties are apt to be catch crops and not to be depended upon.

It will not be gainsayed I think that the education of every man should embrace morality, temperance, kindness, patriotism, admiration and respect for womankind, a love for the beautiful and good in

everything; charity, patience and industry; generosity, frugality and fair dealing; a veneration and respect for such things and observances as are held by men as sacred.

The education of any man and a farmer, especially, that develops the mental nature at the expense of or to the neglect of the moral man is a failure. A man may murder language and be pardoned if he be a gentleman, while to boorishness and selfishness, education, as applied to brilliant intellectual endowment or attainments, is but an exaggeration of vulgarity.

But the gentleman if he does not have the education should get it. If his English is bad he should correct it, by reading and studying such books as shall show him how the makers of the language have written it.

I do not know of any other way to acquire an accurate knowledge of the construction of our language and such a vocabulary as the educated man will find use for. I am not allowed the time in this paper to dwell upon such books as the home student would find eminently useful in the directions I have named.

There is no valid reason why the farmer should not gather all the flowers and the beauties of the language as well as the rougher, more homely and utilitarian parts of it. It will not hurt his plowing, or milking, or sowing, or reaping, if he allows his soul to revel in the beauty, in the sweetness and in the poetry of the life around him. I know that Robert Burns was none the less a good plowman because he sang in the simplest and purest English the sweetest songs man ever sung, and by his Scottish verse made the wide world love him. He could plow and he could sing, and in his own dear way he sang at his plowing. Thus, as he, I would that we farmers were all educated, so that from the plowing to the reaping, we could see and understand and appreciate the rhythm of it all.

THE FARMER'S BOY; HIS EDUCATION.

BY MR. J. H. PEACHY, *Bellerille, Pa.*

The farmer's boy like the poor, we have with us always. He is inseparably connected with the past, associated with the present, and shall even more largely influence the future. He is the prime factor in the problem of life and civilization. History, both sacred and secular, cannot eliminate him from its pages, cannot change the trend of thought so indelibly impressed upon the past, by the representative characters in life's drama.

Whether in the feeding of flocks, or on the tented fields; in the planting of the vine, or amid the hum of the spindle; in the gathering of crops, or in the accumulation of wealth; in the clearing of the forest, or in connecting the continent; in the building of houses, or in the establishment of justice; in the elevation of the individual, or in pleading the cause of the common people; in housing the unfortunate, or in protecting the oppressed; in the dissemination of thought, or in building educational institutions; in all these, and in many more, the voices of history are loud in their praises of the commendable performances of the farmer's boy.

While we love to linger and learn of the past, the boy of the present and future concerns us most. I am in sympathy with my subject, only know of one better, and that is the farmer's girl. I am not so familiar with that subject because I never was a girl. Inasmuch as I cannot talk back, I am unprepared to speak for her.

While these lines may relate more particularly to the boy, I mean the girl also, especially when discussing their education. So long as they are born together, let them be educated together. I do not have a moments sympathy with that half-heathen idea of giving the boy better educational advantages than the girl. It is unjust to discriminate, unwise to claim a superiority, and uncharitable to withhold those inestimable privileges for culture and refinement. The possession of a God-given faculty carries with it the inherent right to cultivate and use that faculty.

The farmer's boy, however, possesses certain characteristics all his own. He is generally found just where you want him. Like the boy's definition for a lie, he is a very present help in time of trouble. A little misunderstanding concerning the affairs of the home, can never be satisfactorily adjusted without the presence of the boy. He is generally responsible for many miscalculations in the home, of which the majority of cases more justly belong to the children of a larger growth.

The boy under consideration is one who worked the first year for his board and clothes, the second year for his clothes and board, and the third year he got both. The boy who labored so faithfully, performing his daily duties in such a meritorious manner. The boy who expected to go to Heaven if he lived and kept his health. This boy of concentration and hope, of lofty ambition and noble aspirations. The boy who received a colt as a present from his father. It was the boy's colt, but when it became a horse it was the father's horse. Quite natural indeed. Did not the boy belong to the father? Was not the horse his also? The boy was just charitable enough to sacrifice his only earthly possession to gratify his father's desires. How truly commendable. This boy then is one of "faith, hope and charity, and the greatest of these is charity."

This boy is also subject to cold, heat, neglect and abuse. When through ignorance or some unknown cause he suffers from ill-treatment, or lack of appreciation, he knows that he has plenty of company. He can work the eight hour system—eight in the forenoon, eight in the afternoon, and if not weary by this time, may chop wood for breakfast. This of course is only applicable to a few favored localities. And when tired nature's sweet restorer, blessed sleep, "covers him all over—thought and all—like a cloak," he forgets the unappreciated side of being a farmer's boy.

But what of his education? Upon one point we certainly can agree; that is, he needs a better education than ever before. The three R's and the little, old, red school house, once the university of the masses, no longer satisfies the demands of the time; no longer prepares the farmer to meet his work. Time was when "no lickin', no larnin'" was the watchword.

With our present knowledge of forestry, the birch and the hickory now accomplishes a better purpose. As we study child-mind and child-nature, considering the effect and influence of environment, the first requirement in teaching a boy the way he should go, is to discard the finger board, which only points the way, but travel the road yourself. You need not necessarily tell the boy of your deviations; he will acquire such knowledge intuitively. He may even read you like a book, before he has mastered the first reader.

Seemingly, the child learns more rapid up to nine years of age than in any other period in life. This to the child is the believing period in its life, when it has more faith in its parents and in other people, than in any other part of its career. Take a retrospective view of your own life and question the truth of the statement, if you will. This then being the formative period of life—that most impressionable age, when the plastic mind of the child can be so moulded and shaped as to effect the destiny of individuals and nations; how truly important is the work of those who live for the children, the possibilities of the future.

The farmer's boy, in part, receives his education in the home. Too often it educates him away from it. If the farmer continually finds fault with his business, grumbles about this, that and the other, and sometimes all three, wearing an acidulated smile on his face, so long that a barber wouldn't shave him for less than a quarter, how can he expect the boy or girl to become interested in the farm. You cannot build up a business by tearing it down. You cannot dignify a calling by saying mean things about it. You cannot inspire confidence without having the inspiration.

The home should teach respect to parents and old age. Not infrequently the high chair rules the home, utterly disregarding the feelings of the other occupants. Too often the entire care of the chil-

dren devolves upon the mother. The business relations of the father are such that the child does not learn to know him.

But what man, great in his generation, or worthy of honorable mention, does not honor and revere the name and memory of his mother. And well he may, because the best thing on earth is a good, kind, educated, Christian mother. When I hear a boy or young man speak unkindly, or disparagingly of his mother, to me it displays a lack of understanding, a want of common sense. She may not be the best woman, but being his mother, is worthy of his highest tribute of respect.

The boy should also be taught to be a man. In part this must necessarily be done in the home. Principles of honesty, integrity and morality can be instilled into the youthful mind, by a careful selection of good books. When taught to lose himself in the minds of others in youth, prepares him for the enjoyment of good company in his maturer years. The child is an imitator. It forms ideals early in life. Having spent the better part of my life in the school room, I could readily see the home through the child in its conduct upon the play ground and in the class room. The home should give to the child a name of which it need never be ashamed. Upon this rock rests the superstructure of a life. This shall play an important part in securing recognition in the contest for individual supremacy. A name above reproach at home, is "like seed sown upon good ground and may bring forth fruit an hundred fold."

Education, according to Spencer, is the preparation for complete living. We may honestly differ as to the means of preparation employed. The ultimate end of education is culture, character and citizenship. The man must represent these three. To form, in education, is a greater principle than to reform. Formation of character is more desirable and more in evidence than reformation of criminals. And yet that Christian woman directing the minds and morals of half a hundred children receives a meager salary in comparison with the warden of the penitentiary.

It is not the province of these lines to criticise. 'Tis not the selection of a primary teacher that occupies the attention of the school board. And yet it is the more important. Genius goes where the money flows. Time was when any fool could farm. Likewise most anybody could teach the little ones. Easier said than done. By way of illustration, Elias Howe invented the sewing machine. He had his own trouble with it. Only one thing wrong with it. It would not sew, until he reversed the thing, by putting the eye in the sharp point of the needle. A little reversing would be beneficial to our schools. I will not say that too much money goes to the top, but that too little finds its way to the bottom. Too much to the head, not enough to the heart. Get the eye nearer the sharp point of the

needle, and the boy's advantages will be improved and the girl's salary will be more nearly commensurate with her work. Such encouragement would infuse new life into the public school system, securing better results than before, by making primary school teaching a more self supporting profession.

In the education of the boy, put yourself in his place occasionally. See whether or not you like the change. There may be a vast difference between being a real boy and being a boy from a man's standpoint. This difference may also be in favor of the natural boy. Dr. Brumbaugh tells us to "teach the boy along the lines of least resistance." This is the only way to teach him successfully. 'Tis not advisable to strike the boy at right angles. Nothing pleasant nor beneficial results from such teaching. Better educate him along parallels and thereby travel the way together. Gain the confidence of the boy and he is at your service, lose it and in too many instances the boy is lost.

It is a lamentable fact, also, that many boys do not become better prepared for profitable living, because of the unclassified school affording no incentive for promotion. Striving to excel in the class-room is highly commendable. The school should prepare a boy to do more out of school than in it. 'Tis here that he meets life with its grave exactions. The home should teach a boy the value of a dollar, the school should help him increase the earning power. Not that money be made the standard of measurement, but that labor is honorable, and the laborer worthy of his hire.

The school should teach a boy to think, by giving him something to think about. That line of thought should relate in part to his future business. If destined to be a "son of the soil," assist him in the study of nature. Help him in the cultivation of the observation. Teach him to see the things in nature so closely allied with his chosen labors. Help him acquire a better knowledge of the science of agriculture, the higher and highest calling known to the category of man's usefulness, because the basis of all other industries, and the one receiving the approval of an All-Wise Creator, and on the "waving uplands of the future" will be seen the farmer standing four-square to the world, like a block of marble, the acknowledged nobility of the land.

The boy of faith, hope and charity, will then be the intelligent farmer with abiding faith in his business, faith in the old farm, with fertility available, humus abundant, and barns bursting with plenty; faith in the development of an idea—the feeding of the world; with the radiant sunshine of hope inspiring him with a love for agricultural pursuits; charitable enough to leave the old farm home with its hallowed recollections of the past, to mingle with that busy throng of commercial activity, whose best blood and brain comes from the rural home.

INSTRUCTION TO THE BEGINNER IN THE POULTRY BUSINESS.

BY MR. T. E. ORR, *Bourc, Pa.*

So it is both gain and glory you want, young man! Well, there is nothing impossible in the combination. Hundreds are realizing both; but to do this, let me tell you of a few things you must be willing to sacrifice:

1. You must give up your morning nap. The real fancier is up in the morning before his hens are off their perches. He must be on intimate terms with his birds. He must know which cock does the early crowing and which hens do the early scratching. He has a name or special designation for nearly every fowl, and he is as familiar with the whims and fancies of each hen as was his mother with the peculiarities of each of her children.

2. You must be willing to wear working clothes. If you are afraid of being sneered at because your clothes are dusty, or would become disheartened if some of the girls with a sniff of their pretty noses, should make some remark about the "odor of the chicken house," you cannot expect to win. The chicken business is not dirty, but it must be dusty. The dog from his bath in the water shakes himself. So does the hen from her bath in the dust-box. You know the result in both cases.

3. You must give up courting your best girl at least four nights in the week. The hour at dusk and the hour just following it are two of the most important in the whole twenty-four. At dusk you can learn the bed-going habits of your birds both old and young, and the hour following is the very best time for using that most useful implement in the poultry business—the lantern. You will thus learn many things. Your birds will become accustomed to handling and will learn to know you as an intimate friend. Many a valuable bird life has been saved by the timely discovery of approaching trouble in the quiet of the night.

Well, if you accept these three conditions we will enroll you as an available candidate for poultry fame. The field is an honorable one, and you will have little cause to be ashamed of the company in which you will find yourself further along. Poultry breeding is by some esteemed too insignificant to command attention. "Small potatoes and few in a hill," sneers the fancier of horses or cattle, perhaps, while his wife, son or daughter may be cleaning up more money with

a few hens than does the head of the house with his four-footed favorites. We know breeders of poultry on a purely commercial basis, who are clearing \$2 per year on each hen. How many breeders of sheep are doing better per capita?

Poultry breeding is not a small business, although the average investment is not large. Since statistics show that the poultry product of the United States far outranks either beef or wheat production, no man need be ashamed to identify himself with the poultry interests. There are probably ten times as many people connected with the poultry business as with the horses and cattle business combined.

Then, too, the standard of intelligence and enterprise of poultry breeders will compare favorably with that of those engaged in any other line of animal husbandry. For twenty years the writer has been in close touch with many live-stock associations, and in none of them has he found the average of intelligence and culture superior to that found in the American Poultry Association. In those twenty years he has attended hundreds of banquets at annual meetings of breeders' associations, and of them all the one that stands out most prominently for the elegance of the appointments, the sumptuousness of the repast and the wealth and ability of the men who made up the company, was a banquet given by a poultry association to breeders and fanciers of poultry.

So, young man, if your fancy has turned to poultry, you will find in the oft-repeated successes and failures of these wealthy fanciers something to stimulate you to your best endeavor. You will find that even a little success in the breeding of any variety of poultry will prove an introduction for you to men you could reach in no other way. You will find these same men helpful and considerate, ever ready to do you a kind turn or speak for you a cheering word. Among real fanciers of poultry a most generous spirit prevails.

A personal illustration of this: Twenty years ago, when struggling along with my first season in the egg business, I received by mail from Buffalo a check for \$3, and an order for two sittings of eggs. Near the close of the season, having heard nothing from the purchaser, I wrote him asking of his success. Promptly came the answer, "Eggs all hatched. Chicks are living on the farm and looking well. When in this city, call and see me." Two years later when in Buffalo, remembering his name and street number, I found the place one of the largest and handsomest on Delaware avenue. I did not call at his residence, but looking him up down town, I found him one of the leading business men of the city and as cordial to the young chicken man as though he too had been a millionaire.

What breed should you select? That is a matter of fancy. Take the breed you like best—the one you admire most. One man will

succeed with the very variety that marks the failure of another. Of course if you expect to make the pay in part from the commercial end of the business, you must select a variety noted either for eggs or flesh, or both. Don't select a variety just because some one else has it. Have some originality of thought and action. Listen courteously to the advice of others, but do business on your own judgment.

Having decided upon your variety, be careful about the strain. Take every honorable advantage of the experience of others. Start just as near the top as possible. Don't begin with dunghills and culls and expect to "breed them up to standard excellence." That has been the pitfall that has entrapped so many. Far better start with a trio that are fine and well-bred birds that can reasonably be expected to reproduce themselves—even though they cost you \$25, than to get fifty nondescripts for that same sum.

Take just one breed. The arguments are numerous. Less expensive as to fences and yards. Better opportunity of exercise in breeding season. No cross-breeding by accident. Remember that the first couplation of a pullet, if by an opposite colored male, may mark her progeny for a year. But the strongest argument is the record of others. No man in the business now at the height of fame but became so by means of a single variety. If you get there it will be because your name becomes so intimately connected with the name of your chosen variety that the one stands for the other. The fact that the eminently successful men have mostly been breeders of several varieties and have gradually reduced the number again and again ought to convince you that the right way is to start with just one breed. As some one has said, "Put all your eggs in one basket—then watch that basket."

Again let me urge that you stick to your breed. Many men about the time success is within their reach with one variety see somebody else going up faster with another; so, throwing away valuable experience, they start at the bottom again. I know a man, now nearly three-score-and-ten, who in the past forty years has been an enthusiastic breeder of thirty-one different varieties of fowls, and yet never more than three varieties at one time. The money he has spent in buying stock has exceeded his total receipts ten fold. I know another man nearly the same age who has bred Plymouth Rocks for thirty years, and in the past fifteen years has failed but once to clear \$1,000 per year; yet in all that time he never had another variety on his place but once. Just once he was induced to add White Plymouth Rocks. That year he didn't make any money, and lost a part of the trade he had always held because he was an exclusive breeder of the barred variety.

What about the house? It doesn't matter much. My first house was a piano box in the back yard—my first breeding pen a cockerel and four pullets. Inside of four years the descendants of that pen were bringing me \$10 each for eggs for hatching and they never had a fine house and they never had a large yard. I know a man to-day who produces more than \$1,000 worth of stock each year, and his entire premises are only 40 by 120 feet.

Biddy is not an exacting tenant. The three C's are what she demands: Comfort, Convenience, Cleanliness. Comfort means freedom from cracks and draughts in winter, and shade, with a chance to dig in the earth in summer. Convenience means constant access to bone, shell, gravel, dust and water. With all these it does not matter so much what you feed her so she has enough and must work for it. A variety of grain, together with some meat and green stuff, is decidedly of advantage. Cleanliness means no damp nastiness; no lice; lots of dry litter to compel exercise.

Yards? Yes, the larger the better in mild weather, provided the hens work for their feed in the farther end of the lot. A big space is desirable provided it is used. It is not an essential.

Now that you and your birds are on intimate terms, how are you going to get them before the public?

1. You must be so in love with the business that you will be an enthusiast—a crank, if you please, and keep turning. You will think chicken, talk chicken, dream chicken. People will call you chicken crazy. No matter; plead "guilty" and go ahead. Prove to them that you have something worth talking about. At first they will laugh at you, next they will stop and look at your chickens and perhaps be reckless enough to offer to "swap a setting of eggs with you." Keep right on. When they see your cash orders coming in from a distance they will be crazy for your stock. Then treat them rather indifferently. Take care of the foreign customer first. Make your local man lay down his cash like the others. Don't trust him, even if he is wealthy. He'll respect you all the more for it.

2. You must patronize the show room, at first as a visitor and then as an exhibitor. As a visitor you are sure to say, "I have better birds at home." Bring them out and see if you have. Let the judge and the public decide that point. Go to the show confident that you will win, but before you come home be sure to know why you lost. Don't be a kicker. If you lose at first, keep on. It is a good investment. If you win at first at a small show, send to a large one before you allow your head to swell. Pay \$1 or \$2 per bird as entry fee and get in among the "big guns." If you win there "you're it." Then you can begin to let the people know it in good earnest.

3. Your main hope for publicity must be printer's ink. Other things are good but they do not go far enough. The one thing on

which you can afford to be extravagant is advertising. It is an investment not for this year alone, but for all time. You may over-advertise this year and not be able to fill your orders. Nothing else makes you so sure of that man's order next year. He'll come earlier next time.

How advertise? Neat letter heads, envelopes and circulars count for something, but the poultry papers must be your main dependence. Select your medium by cultivating an intimate acquaintance in advance with the poultry journals. Determine by the reading matter something of the character of the readers of each paper, and then decide which class of people are most likely to buy what you have to sell.

You owe the poultry journals much. They have helped to educate you; they have put you in touch with the poultry loving public; they have reported your winnings at the show. You owe them your advertising patronage, and if you aim at prominence you will be more dependent upon them each year. Get in touch with the editors and publishers. Help introduce them and their journals to your friends and neighbors. Send them some subscriptions in addition to your own. You will get your pay with interest.

But don't imagine that these little courtesies will exonerate you from carrying an advertisement. Don't try to beat your way to publicity by cunning devices to obtain free illustrations and reading notices. Publishers are not stupid nor slow. Be generous; be liberal in your advertising appropriation. It is good business. It is suicidal to follow any other policy. By all means make your contracts on a yearly basis. You should have something to sell nearly every month in the year, and it costs less to carry a card of some kind twelve months than nine months. You want your name to be seen in every household every month in the year.

And lastly, in the line of profitable publicity, I would suggest that you get into personal touch with leading breeders by connecting yourself with your local poultry show, with the specialty club of your chosen variety and with the American Poultry Association. These suggestions seem not to need argument. If you show yourself worthy of confidence you will obtain it. If you show yourself capable of managing your poultry affairs the leaders in these organizations will be glad to welcome you as a fellow worker and will cheerfully turn over a portion of the burdens to you. Don't be selfish. Don't be a place-seeker. Be willing to do some of the drudgery. Be willing to climb slowly, and almost before you know it you will find that both honors and profits are yours.

THE ADVANTAGES OF A KNOWLEDGE OF CHEMISTRY TO THE FARMER.

BY PROF. FRANKLIN MENGES, *York, Pa.*

We need not demonstrate that different soils and crops require special methods of cultivation and fertilization to produce the best results for the farmer and the soil, and that a knowledge of chemistry is of advantage to the farmer in this work is equally axiomatic.

The time was when the farmer's efforts were directed to produce the largest crop possible, regardless of the consequences to the soil; but now he considers his soil also, and farms to produce the best conditions in the soil for the rotation he follows, so that each crop shall leave the soil physically and chemically better than it found it.

We may say, in passing, that in this discussion we do not forget that the physical conditions of the soil must not be neglected, nor the preferences that certain plants manifest for certain types of soil, such as the potato for a sandy soil, corn for a medium sandy and clay soil, wheat for a silt soil, etc., all of which seems to be largely due to the physical conditions of the soil, such as its water-holding power, the prevention of loss of water by evaporation and the temperature required by those plants for growth.

If these are facts, and we do not question them, then certainly a study of the water-holding capacity of any soil is important; how to increase and under certain conditions diminish it, how to prevent loss of water by evaporation, how to increase capillary action, and how to check it, when to roll and when to cultivate a soil to retard or facilitate these processes, when to practice sub-soiling, when to mulch a soil, when to plow deep and when shallow, when to practice fall and when spring plowing, how to drain to prevent surface accumulation and loss of water, how to counteract the detrimental influences on the water-holding power of soils in recently deforested regions where the atmosphere seems to have become dryer and the soil harder, because of the loss of water formerly transfixed by the vast forests and given to the air, but which is now largely derived from the soil.

But a study of the temperature conditions of soils is equally important, for all plants require a certain amount of heat for germination, growth and development, and to know how to change the texture of a soil by its introduction of organic matter to furnish material for combustion and the absorption of solar heat demands the careful consideration of the farmer.

From this casual enumeration of physical conditions we see the value of such a study of the soil; but with all this knowledge, the farmer will not know anything of the chemical composition of his soil, its crop producing power, due to fertilizing elements, contained in it, nor the fertilizer that should be applied to it. In short, physically considered, a soil is made up of disintegrated rock mixed with organic matter; chemically considered, it is made up of a large number of simple and complex chemical compounds. In considering these chemical compounds, we should confine ourselves to those in which the soils are usually deficient, such as nitrogen, phosphorus, potash and lime.

The classes of compounds formed in the soil with these elements are organic and inorganic. The inorganic compounds of nitrogen are the nitrate and nitrite of potash and the nitrates of lime and soda. All of these are very soluble in water, and therefore there are usually very small quantities of them in the soil, because being so easily dissolved they are readily washed out by the rain and lost or carried down into the sub-soil. The phosphates and phosphoric acid in the soil amounting from 1000 to 8000 pounds per acre, are supposed to have been derived from the remains of marine animals and sea water, and during geological times to have undergone many changes and occur now as the inorganic phosphates of lime, aluminum and iron, and are mostly unavailable for plant food.

The potash of the soil amounting to from 3,000 to 12,000 pounds per acre is present in the form of silicates. It is derived from feldspar, the cementing material of many rocks, such as granite. Feldspar is more readily acted on by atmospheric agencies than the other minerals of which the rock is composed, and consequently the rock gradually falls to pieces, and when the feldspar is further decomposed it forms clays and potash compounds. Mica also contains potash, and soils formed by the decomposition of micaceous rock are usually fertile. The formations of clays by these decompositions brings about a condition for the formation of zeolitic minerals, which contain potash, members of the potash family and water. These zeolitic minerals have the power of fixing and holding plant food in an insoluble and yet available condition for plants. Lime is present in the soil in the inorganic forms of common limestone, the various silicates, dolomite and sulphate or gypsum; all of which are important factors in the fertility of the soil.

The organic compounds, however, perform the vital functions in the soil for it is through this agency that chemical action is kept up, and the inorganic fertilizing substances are made available and that the micro-organisms which produce nitrification are maintained.

Humus is the chief organic constituent of the soil and is derived from animal and vegetable matter, and is in an intermediate state

of decomposition. When this process of decomposition is going on in the soil, organic substances are produced of an acid nature, which when they come in contact with substances of an alkali nature, such as lime, potash and soda, they form neutral bodies or organic salts, called humates, and the process is called humification. The fact that this chemical action takes place in the soil between the humic acid and the potash, has been experimentally demonstrated by mixing known quantities of organic materials, such as green clover, meat scrap, saw dust and farm manure, containing known percentages of potash, with soil and allowing humification to go on for a year or two under normal conditions. It was found that the humus produced in this way contained from 4 to 10 per cent. more potash than the original organic substances, and the humus in the original soil. Not only is this the case, but it has been discovered that humus formed from organic matter containing nitrogen is more valuable, not only for its nitrogen content, but because it has the power of combining with, and extracting 2 to 3 per cent. more of the insoluble potash and phosphoric acid than humus from organic substances containing little or no nitrogen; and at the same time putting its original nitrogen nearer the available condition. It has not only been shown that these humates increase the fertility of the soil, but that they put plant food in such a condition that plants can appropriate it. Oats planted in sand containing no fertilizing elements except that which was added in the form of humus, produced normal crops.

In order that humification may go on unobstructed and produce the best results, soils must contain a sufficient amount of alkali, such as lime, to produce the neutral humates above referred to.

The best method of keeping up a supply of humus is by the use of large quantities of farm manure and an intelligent rotation of crops. Loss of humus is always going on in the soil and when a soil is continuously cultivated without the addition of organic matter, and lime, the humus will be greatly reduced and will finally change into the inert form because little of it is left except carbon and oxygen. This reaction takes place more readily in sandy than in clay soils, therefore they are always more in need of humus than clay soils, and show the need of it more.

We have seen that humus formed from organic substances containing nitrogen is more valuable than humus formed from organic substances containing little or no nitrogen; especially is this the case with humus formed from decaying vegetable matter of leguminous plants. It has been demonstrated beyond a doubt that the legumes have the power to obtain nitrogen directly from the air, through the agency of an organism which form little nodules on their roots, where it takes up the free nitrogen of the air and con-

verts into such a condition that the plant can use it. The nitrogen accumulated in this way and distributed through the roots and branches of the plants remains in the soil and forms a humus rich in nitrogen, and adds the most valuable fertilizer without any expense to the farmer. Through the agency of these and similar organisms and plants, the properties of which we have not yet discovered, the nitrogen of the soil has been accumulated. We have not only these nitrogen accumulating organisms in the soil, but a large number of others, among which are the nitrifying bacteria which convert the nitrogen of the organic matter into nitrites and nitrates which seems to be the most available condition of plants to use it. This process is called nitrification and the following conditions have been found to be essential for the development and operations of the bacterium which produces it.

1. A supply of food for the bacterium, consisting of the humates of phosphoric acid and potash.

2. A sufficient supply of oxygen, because the bacterium belongs to aerobic class.

3. An amount of moisture to enable the bacterium to produce the chemical changes required.

4. A temperature ranging between 54 and 77 degrees F.

5. The absence of strong sunlight, because like most of these plants it can not thrive in strong sunlight, but immediately beneath the surface of the soil in the presence of air seems to be the most prolific field for its development and operations.

6. The presence of some alkali element, such as lime, to combine with the nitric acid formed by the organism for the absence of an alkali is the most potent factor for non-nitrification.

There seems to be two stages of nitrification and two bacteria, one for each stage, nitrous and nitric bacteria, both of which make nitrogen available for plant food. We have not only these beneficial bacteria in the soil, but some which produce exactly the opposite results; instead of preparing available nitrogen in the soil, they set it free. The bacterium which produces these results belongs to the anaerobic class, which thrives only in the absence of air, and the conditions most favorable for its operations is a soil so saturated with water or so compacted as to exclude all air; when these conditions prevail, the nitrogen of the organic matter in the soil is set free. Nitrogen can not be fixed in the soil like the rest of the fertilizing elements, such as potash and phosphorus, because all the salts of nitric acid are soluble in water. There is a general tendency for the soluble phosphates and potash fertilizer to become fixed or to change into the insoluble state. When a solution of potassium nitrate is added to a column of clay soil it will be found that the filtrate running through contains barely a trace of potassium nitrate, but in-

stead calcium nitrate; the potassium in the nitrate having been replaced by calcium and the potassium having become fixed. This process is known as fixation. We notice that the potassium is fixed and the nitrate passes through the soil by combining with another basic element which forms a soluble salt with it, and therefore cannot be fixed. It has been shown by experiment that this fixation is due to zeolitic minerals or silicates, humus and carbonate of lime, and that it is greatest in heavy clay soils and least in sandy soils. It is one of the most desirable properties and can be developed in sandy soils by adding humus and carbonate of lime. If it were not for this property the soil in regions of heavy rains would become sterile. The fertilizer which undergoes fixation still remains available, especially in soils containing a large amount of humus derived from farm manure and leguminous plants.

FARM MANURE.

Farm manure is the most valuable and at the same time one of the most variable compositions produced on the farm. It varies as do the animals that produce it, and as the foods with which they are fed, and to a certain degree as the absorbents that are used to absorb it. Not only have the animals, the foods and absorbents so great an influence on its composition, but the methods of preserving and composting it, have more influence on its fertilizing value than all combined. Leaching is the greatest agency of loss in manure. When horse manure is thrown on a loose pile, subject to the agencies of the atmosphere and leaching, it will loose as high as 60 per cent of its fertilizing value in six months. Another agency of loss is injurious fermentation. In the manure pile as in the soil aerobic and anaerobic fermentation is going on, the former by bacteria requiring an ample supply of air or oxygen for their work, the latter the entire absence of this element. In the manure pile conditions favorable for anaerobic fermentation should prevail, whereas in the soil aerobic should and must be encouraged, because they render plant food available and the anaerobic unavailable.

To secure anaerobic fermentation the manure pile must be so constructed that air is excluded, water retained, both that which is contained in the manure, and that which it may become necessary to add when lengthy droughts prevail. Manure produced under cover, as in stables, has all necessary conditions, namely compactness, exclusion of air, a sufficient amount of water, prevention of leaching, and favorable environment for anaerobic fermentation. But whatever composting, sheltering, etc., may do for manure, the best and most economic method is to haul it directly from the stable to the field, because no leaching occurs, it mixes with the soil, and is in position for aerobic fermentation to act on it, it produces conditions

favorable for nitrification, it combines with the mineral matter of the soil and produces humates, it acts as a mulch and prevents the evaporation of water.

The farmer should have so accurate a knowledge of the fertilizing power of his manure and the physical and chemical requirements of the various soils he cultivates and crops he raises that he can always apply it to make it subserve the best purposes, by adding plant food forming humates, making inert plant food available, producing nitrification, changing the texture of the soil, raising the temperature, increasing the water holding capacity, producing chemical action and always having some plant food available when the plant may need it.

COMMERCIAL FERTILIZER.

However economically we may conserve plant food it will in many soils become exhausted beyond the power of the plant to obtain what it needs for its perfect growth; and then we will have to use some form of commercial fertilizer. Lime is the commonest of the fertilizers and is an essential element of plant food. The average crop requires from 8 to 75 pounds per acre and whenever lime is deficient plants lack vitality and can not withstand drought or anything that hinders the vital processes.

Lime acts both chemically and physically on the soil. Chemically it unites with the humic acid and forms humates of lime, it liberates potash and aids nitrification. Physically it improves the capillarity of the soil and cements soil particles and prevents washing. In many soils having an ample supply of lime a light application of air slaked lime will prove very beneficial. Commercial fertilizer is made mostly of substances containing plant food in concentrated form. Nitrate of soda, kainit and dissolved phosphate rock are the substances commonly used for making what is called a complete fertilizer.

For nitrate we sometimes find such substitutes as dried blood, flesh meal, tankage, fish scrap (both of which contain phosphoric acid), leather, waste hair and seed residue. For dissolved rock we sometimes receive the more desirable dissolved bone, bone black and Thomas slag; and for kainit we find wood ashes, tobacco stems and even feldspar substituted.

Nitrate of soda when pure contains 16.49 per cent. nitrogen. Dissolved phosphate rock contains 12 to 14 per cent. Phosphoric acid and kainit contains about 12 per cent potash.

Suppose we desire to make a ton of what is usually known as a complete fertilizer, we would mix:

250 lbs. nitrate of soda, furnishing 40 lbs. nitrogen.

450 lbs. kainit, furnishing 56 lbs. potash.

1300 lbs dissolved rock, furnishing 182 lbs. phosphoric acid.

This is a complete fertilizer, and if mixed at home would cost the farmer at present prices exclusive of transportation about \$18.50.

A more highly concentrated form could be made by using for nitrate of soda, sulphate of ammonia, for kainit the high grade sulphate of potash, and for dissolved rock super-phosphate:

250 lbs. sulphate ammonia, containing 20 per cent. nitrogen, furnishes 50 lbs. nitrogen.

450 lbs. sulphate of potash, containing 50 per cent. potash, furnishes 225 lbs. potash.

1300 lbs. super-phosphate, containing 35 per cent. phosphoric acid, furnishes 455 lbs. phosphorus acid.

This is one of the most concentrated fertilizers that can be made, and would cost if mixed at home, exclusive of transportation, about \$46.50, at present prices of ingredients. Home mixing is one of the things the farmer should understand, for if he can not buy what he needs in the markets at such prices as he can afford to pay, he can make up any composition he may need, and at prices he can afford.

If he needs only phosphoric acid he will make up a composition containing only phosphoric acid; if he needs only potash, he will use only potash, if only nitrogen he will use only nitrogen; if he needs two or three he will use the two or three. How can the farmer discover what his soil needs? By field trials. A piece of land of uniform texture and fertility should be chosen and thoroughly cultivated and prepared for the trials. An acre is divided into ten equal parts and either wheat or corn is taken for the trial crop. Make a preliminary trial the first year and verify it next. Small spaces should be reserved between each of the ten spaces.

The first one-tenth of an acre receives no fertilizer, and is used for comparison.

The second receives what is called a complete fertilizer: 8 lbs. nitrate of soda, 16 lbs. acid phosphate and 8 lbs. kainit.

The third receives nitrate of soda and acid phosphate.

The fourth receives nitrate of soda and kainit.

The fifth receives acid phosphate and kainit.

The sixth receives nitrate of soda.

The seventh receives kainit.

The eighth receives acid phosphate.

The ninth receives farm manure.

The tenth receives gypsum.

The fertilizer should be applied after thorough cultivation and before seeding.

VERIFICATION.

If a deficiency of nitrogen is indicated in the first experiment, select two crops, one such as wheat, which is particularly benefitted by nitrogen, and another, such as corn, which has no difficulty in ob-

taining this element. Sow broadcast 8 lbs. nitrate of soda on the wheat and corn plots, leaving a plot each for wheat and corn unfertilized. Should both corn and wheat respond favorably to the application of nitrogen, then the soil is in need of available nitrogen. Should the wheat alone respond and the corn not, then the soil is not in great need of nitrogen, but does not contain much in available form.

To test the soil whether it is deficient in phosphoric acid, use the same method as above, and apply 16 lbs. acid phosphate. Sow one plot with barley and the other with turnips. If both crops show marked benefit then the soil is in need of available phosphoric acid. If only the turnips respond then the soil contains a sufficient amount of phosphoric acid. To determine whether a soil is deficient in potash, proceed in the same way as before with the plots, and use potatoes and oats. If there is a decided increase of yield in both cases the soil is in need of available potash. If the potatoes alone respond and there is very little difference in the oat crop, indicates that the potash is not in the most available form, but that it is not deficient, especially is this the case if there is no increase in the oat crop. The importance of these field trials is obvious to any one, for in this way the farmer can analyze his own soil, and can discover in two seasons its fertilizer deficiency, whereas if whole fields were taken for the trials, at least six to eight years would have been required, and during all this time the soil would not have received the proper fertilizer, and unnecessary and expensive plant food would have been provided. *These trials will help us to answer the question, does the use of fertilizers pay? What quantities to use? How and when and for what crops to use it? They also give us some idea of the feeding capacities of our agricultural crops, and in this way help us to establish a rotation by means of which we can secure the best results for our soils, and get the largest yields for labor and fertilizer expended.

ROTATIONS.

1. In a rotation, a shallow and deep rooting crop should follow each other, so that the demand for plant food is shifted.
2. Crops that produce humus and crops that consume humus should alternate or if possible be raised together.
3. Crops should be rotated so that the fertilizing materials left by the preceding crop are in the best condition for the succeeding one.
4. The weak feeding crop if it is a desirable one should be put in the rotation when the fertilizing substances are in the most available form.

* These trial experiments are similar to those given in Snyder's *Chemistry of Soils and Fertilizer* with a few additions of other experiments. (Author.)

5. Crops of dissimilar feeding habits should follow each other to release the soil of excessive demands for special elements of plant food.

6. The rotation should be so arranged that in connection with the humus produced and the farm manure the soil is kept in the best mechanical condition.

7. Rotations should be planned so as to produce the fodder for stock that both in the form of milk and live stock, some important crop can be sold off the farm, in addition one cereal and some of the grasses. We have seen how a knowledge of chemistry will help us to understand in what condition the fertilizing elements occur in our soil, how to produce humus, how to produce the best humus, how to produce humification, how to produce nitrification. How to prevent denitrification, how to preserve manure if it be necessary to do so, how best to utilize farm manure, how and when to use lime, how to make commercial fertilizer, how to determine what fertilizer our crop and soils need, how it helps us to recognize the feeding capacities of our agricultural plants, how to establish a rotation from which we may get the best results all around. Will not then a knowledge of chemistry be of advantage to the farmer?

WHAT ARRANGEMENTS SHOULD BE MADE FOR THE ENTERTAINMENT OF LOCAL LECTURERS.

BY MR. D. A. KNIPPENBERG *Lake City, Pa.*

Years ago—I know not how long—a man who was wiser than he knew, gave utterance to a sentence of five words, a sentence which has come down to us unchallenged, and accepted by the world as true as the words of Holy Writ, “Honesty is the Best Policy.” The county chairman who arranges for a Farmer’s Institute should frame those words in letters of gold in his inner consciousness, and keep them ever before him.

This will give him the first requisite for success in his position, the respect of the community in which he lives. He must not be afraid to let the people know just how much money he is getting from the State Department for his work, and just what he proposes to do with it.

If he takes the people into his confidence, they will not abuse it; and if he can show that he is interested enough in the success of the

institute to use it all, and if necessary to add a little from his own funds to help out, that confidence will be increased and will inspire interest in others. But just so long as the people hold the idea that the county chairman is getting good pay, and expects local help to furnish a large part of the instruction and entertainment; just so long there will be apathy and a lack of genuine interest that will handicap the institute.

We can not ignore the fact that a county chairman who is a successful farmer, who is popular, and respected for his honesty, is the first and best factor in the making of a Farmer's Institute which will bear fruit in promoting better farming in the community in which it is held; and an institute that will not bear fruit of this kind is not worth the time and trouble used in its promotion. Now, let the county chairman select his home helpers; tell them just what he wants of them, and get their assurance that they will be present and prepared to speak on the topic assigned.

Let him interest the mother in the preparation of a paper of live interest to her sisters on the farm, or get her to take a part in the musical program. Let him ask the beautiful and accomplished daughter of whom the parents are so justly proud, to give a recitation to add zest to the meeting. Let him approach the bright boys, and there are many of them on the farm, for an essay on farm topics, a declamation or a song.

In this way he will insure the attendance of every family from which a member has been chosen to take part, as well as their immediate circle of friends. This is no trick played upon the unwary. It is simply the exercise of plain God-given common sense, and its twin sister, tact. Tact is the lever with which the wise man has moved the world through the centuries that are past, and will be through those that are to come, and the county chairman needs a full supply.

To broaden and deepen the circle of interest, let him carefully select a committee of twelve good and true men, citizens of the place, who will make it their duty to be present and welcome those who come, and do all in their power to make them feel at home, and give an echo to the thoughts that have appealed to them in the meetings.

From the splendid help sent out by the State Department, men filled with practical ideas on the topics they discuss, there will be no lack of food for thought.

And now after all this, if the county chairman would be perfect, let him still further show his industry in general field work on the ground, by a nod of approval where it is merited, a hearty hand shake, here a smile of approval, and there a dollar slipped unobtrusively into the hand of one who has done good work, and who needs that form of recognition. In this way the chairman can round out the

meeting and leave a wholesome feeling of satisfaction and good-will that will work wonders for the future meetings.

Go ye, my brethren, and mark the perfect chairman, and note, that if each succeeding institute is a little better than its predecessor, you owe it partly at least to him; that he has put in motion and fostered an influence that will spread throughout the length and breadth of our great Commonwealth, and that will result in wider knowledge and in better living for the men and the women who dwell on the sloping hillsides and amid the green meadows of this great Keystone of the federal arch.

We have thus far treated the local lecturer as the entertainer, rather than the one who needs to be entertained, and so he should be considered; for, if he comes in the right spirit, he comes to give of his knowledge and his experience, but to whom? Not to vacancy and empty seats, but to a waiting, receptive gathering of men and women who need his help; and so we have given special emphasis to the means for securing an audience, which will be the first step in giving him the entertainment that will stimulate his brain and give him fluency of speech. Another step in his proper entertainment we have already hinted at, namely, a hearty hand clasp and words of commendation, the verdict, "well done, good and faithful servant," enunciated first by the chairman and repeated by his faithful twelve. If that does not entertain him and make his soul wax fat with satisfaction, he is a ghoul and not human; and we want neither him nor any of his class to instruct us.

Should the lecturer come from some little distance, he should not be suffered to carry a dinner pail. Turn him over to the tender mercies of the best nearby farmer, who will let him in on the ground floor of a hospitable home, and though he be an angel unawares, he will find entertainment that will warm his heart and make it glad. The county chairman must be wide-awake with alertness to see to this. He must be vigilant and tireless, doing the things to be done in their season, and by promptly discharging each duty as it comes, be ready and prepared to meet the next need that confronts him. In this way he will deserve not only his own self respect, but will earn the approbation and gratitude of the powers that appointed him, and will stand approved as the servant who has been faithful in little things, and so fitted for the higher trusts that may come his way. These may seem like little things, but great results are always made up of the aggregation of smaller details, which must not be postponed nor neglected, else there will be only signal failure where there ought to be success.

In conclusion, let me say, blessed and honored shall that man be, who is broad enough to take the small duties of life and weave them

into a matchless tapestry, upon which the world will gaze with delight, because they can see therein the persevering and homogeneous design of a great soul.

SOME ESSENTIAL FEATURES WHICH AN INSTITUTE LECTURER SHOULD POSSESS.

BY MR. JOEL A. HERR, *Cedar Springs, Pa.*

A good speech is described as having three valuable points, viz:

1. Have something to say.
2. Say it.
3. Stop when you have said it.

Acting upon this description I will consider

1. "WHAT TO SAY."

1. An Institute lecturer is not expected to know all about every subject which may properly be brought before a Farmer's Institute.

2. He should have a few subjects on which his own practical experience and observation has especially fitted him to give information of a practical nature.

3. He should be able to apply his information to the peculiarities of the locality of the Institute. A difference of latitude or altitude of soil and moisture or markets, often widely vary the methods of growing the same kind of crops.

4. He should avoid exaggeration, or any assertions that would lead people to unreasonable expectations, and in the end to bitter disappointment. Yet he should have high ideals and show practically and plainly how they may be reached.

5. He should give his audience the credit of knowing something, and not unduly waste precious time in simplifying and repeating the thought he may have to present unless there is a special call for it.

6. His talks should be up to date and full of practical experience and of recent investigation.

7. When quoting the experience and assertions of another, he should give the proper credit.

8. His earnest effort should be to instruct in his chosen subject, and impress his audience with the important truths of his topic, and the best practical methods of reaping good results from the same, rather than the importance and wonderful experiences and great attainments of the speaker. In other words, he should seek to

impress his audience with the importance of his subject, rather than with the importance of himself.

9. He should not consider it his duty to talk upon every subject that comes before the Institute.

10. A speaker should give his failures as well as his successes. The pitfalls in the way of farmers are more to be studied than the successes, as they are more numerous and more hidden. Successes advertise themselves, while failures are more or less hidden from sight and kept secret.

11. The speakers which the State sends to Farmers' Institutes, and especially the leaders of the different sections, should be persons of more than average education. They should be above their audiences, especially on the subjects which are published in the Institute Bulletin as the ones they consent to use.

They should be able to speak the English language correctly and know something of its grammar. The respect for the speaker and for the Institutes is in a measure gauged by the use of good language, as well as the practical information presented by the speaker.

It is true that we may get a great deal of the best quality of practical information from persons who are not scholarly, and such persons are often valuable as aids at Institutes, but if the acknowledged leaders in institute work exhibit a marked lack of good language and of general information, the standard of institute work will be proportionately lowered.

12. Do not take up valuable time at the beginning of a talk with apology and explanation and in lengthy compliments. Sail right into the merits of the question at once.

Time at Institutes is precious, and a common criticism is that we undertake to discuss more subjects than the time affords. Hence the necessity of economizing time as much as possible.

13. When you cannot answer a question asked you, be honest enough to acknowledge it.

2. "HOW TO SAY IT."

1. The speaker who cannot make himself or herself heard by the entire audience it at least a partial failure.

Distinct articulation in a tone loud enough to be heard distinctly by the entire audience is not only a most important qualification to an Institute lecturer, but of equal importance to an effective presiding officer.

What matters it how many good things are said if the audience cannot hear them. Speakers and presiding officers are entirely too apt to fail to make themselves heard, because they do not realize how loud a tone is required to reach the remotest parts of the audience room. Hence a disorder and lack of attention soon develops

in the audience, which is more excusable in the audience than it is in the speaker. The secret of keeping good order is in saying something good and in making people hear it.

2. Many otherwise good Institute workers are incapacitated for effective work by reason of defect of voice or articulation. It is only at special times and places that they can be used with good effect. It requires a knowledge of their defects to program them properly.

3. The Institute worker should be enthused in his work and he will import enthusiasm to his audience. Enthusiasm is what counts in the struggle for supremacy in any line of work.

4. Institute addresses should seldom be lengthy. During the day sessions twenty minutes is usually long enough. An evening lecture should seldom exceed thirty minutes. The character of the address and the ability of the speaker must determine it.

Speakers had better let the audience be the judges of their ability and "proceed to close" when a weariness or want of attention in the audience suggests it.

5. Speakers are usually much more interesting and effective if their addresses are given extemporaneously than when read from manuscript. Very much, however, depends upon the reading. How often have we been deeply mortified to hear a really valuable and well prepared paper worse than sacrificed by the miserably poor reading of it.

If properly rendered written addresses are even more valuable than impromptu or extemporaneous ones, because of their being condensed into briefer space, clothed in better and more expressive language, and expressive of more profound and deliberate thought, as well as of more accurate information. It would be better if some speakers would always write their addresses. We believe, however, that extemporaneous addresses are usually better received and more effective, and all constantly employed Institute lectures should qualify themselves to speak extemporaneously.

6. It is a very happy qualification in a lecturer to be able to interperse his serious talk with a humorous anecdote or story illustrating his thought, but the humorous and frivolous should never preponderate over the more serious and earnest thoughtfulness which should characterize institute work. The attempt to introduce mirth and story into a talk by one whose natural talent runs in the opposite direction, usually proves a dismal failure.

Institute lecturers should aim to interest the intellectuality of their audience rather than to cater to the humorous and often foolish sense of their audiences by ridiculous and mirth provoking stories, that have neither illustration or point in them.

Many a serious thoughtful lecture, freighted with valuable information, and which engaged the thoughtful, earnest attention and appreciation of the audience, has been partially if not wholly robbed of its value by being followed by a nonsensical and ridiculous comic lecture or recitation, which completely diverted the minds of the people from the effect of the more serious talk. A little discrimination in this matter would make a happy combination that would enliven the audience without sacrificing the good work of the Institute in the effort.

3. "WHEN TO STOP."

1. The practice of hanging on, explaining, apologizing and repeating in order to lengthen out a speech is reprehensible and spoils what was a good talk.

2. Don't act as if you feared the audience might think you had exhausted your knowledge of the subject, and you desired to convince them otherwise. Better (like Sam Weller's valentine) stop just when it is interesting, than to try to exhaust the subject and weary the audience.

3. When you have spoken your best practical thought upon the subject being discussed, without any apology, stop short, as I do now.

THE PENNSYLVANIA FARMER AS A DAIRYMAN—RETROSPECTIVE AND PROSPECTIVE.

BY MR. L. W. LIGHTY, *East Berlin, Pa.*

It is a peculiarity of the Pennsylvania farmer, especially the southern Pennsylvania farmer, to have an idea that it is not farming unless a lot of milch cows are kept. This has been for generations and for the lands sake no doubt it was good.

Two generations ago the butter as made was packed in brine, and about twice a year it was sent with the regular teams (the only means of transportation), to Baltimore, the main outlet for the produce of our extensive and fertile valleys, while farther east it went to Philadelphia. One generation later, the business of butter making on the farm had grown to such immense proportions that a class of middle men sprung up who made it their business to weekly or semi-weekly collect the butter, driving from farm to farm, often making a trip of 150 miles to gather a ton of butter and market it. This butter was practically all made by the farmer's good wife. She would

do the milking, manage the milk, churn the butter and make it in nice rolls, then, I am sorry to record, in many cases, her lord of creation would do the rest—that is, pocket the money. This refers especially to the “Pennsylvania Dutch,” more genteelly called Pennsylvania Germans.

But during the last decade the old meandering “huckster” passed out of existence, and nearly all of the farmers’ milk goes to the separator creamery. The good woman of the house needs do no more now than the milking, and in some cases she rebels against that and I hope she will continue to do so.

This revolution in dairying on the farm has been all along for the better; that is, we have a better product, we have less work and cost of making and marketing is reduced, which means that we now get a dollar for much less energy expended than farming, only formerly we men folks applied more of the said energy by proxy.

The creamery system, as we have it at present, in many of the most thickly settled dairy counties, is far from perfect; yes, very far. But for districts far from market, it is certainly a great improvement on former methods. In districts sparsely populated, or within reach of mining or manufacturing towns or any other good market, the farmers still continue to make and market their own butter, and as I am included in that number, I will address the rest of my remarks to that class.

I am sorry to say that a rather large per cent. of butter made by the farmers is not very good and some is abominably bad, but I would also incidentally say the same holds true about creamery butter, of course, the creamery men blame the farmer, but I happen to know some cases where the butter maker did not even know the difference between good and bad butter. I do hope our Agricultural College will continue to turn out men fitted to take charge of our creameries, as not a few are at it now who know about as much of buttermaking as a mule does of gravitation, and the farmer must suffer the consequences.

But to the farmers as butter makers.

I marketed butter for a number of years and visited a number of markets where farmers market their butter, and I have yet the first case to find where A No. 1 butter was not in big demand at good prices, while poor butter was a drag and drag on the market, and had to be sold for a mere pittance in many cases. I so often hear the remark, if farmers all would adopt these better methods, your good prices would soon be a thing of the past. I can hardly conceive such a calamity, and I prefer not to cross the bridge until I get to it. But in the case of butter, I am quite sure if all would make good butter our best prices would be better and we all would get those prices.

If a person wants to buy butter, he means to have butter, and if he wants grease he will buy lard, neatsfoot oil or axle grease; and if a person has butter that is fit for nothing but to take the place of the aforementioned, he must lower his prices to a level of those articles, and that bears down prices even for a good article. The maker of bad butter, not only wrongs, yea, robs himself, but his neighbor also.

If you want to get a first class butter to market, you must start in the beginning of the process and all along the line erect a series of defences, as it were—like Gen. Kitchner did in South Africa, and then like in his case, you may be broken in upon at times, your wires cut, your trains smashed and some of your dude soldiers (notions) captured.

First, the cow manufactures the milk and butter fats and from the feed and water you give her. See to it that it is pure, wholesome and nourishing and of the right and proper quantity and proportion. The cow is a machine and she is a mother. As a machine you want to have her utilize all possible energy to turn out the desired product. As a mother she has an extremely sensitive organism, which demands the same thoughtful care in providing for her comfort that we give to our human kind. Make your cow perfectly comfortable and most emphatically keep her perfectly clean.

Unless your cow is clean you can not have clean milk, and if you have milk that is not perfectly clean, better feed it to the pigs at once. Don't depend on the milk strainer, as there is no strainer on the market that will strain out of the milk dirt in solution. If you keep the dirt out of the milk, you are on the high road to success.

You may talk learnedly about germs, bacteria, bacilli, streptococcus, micrococcus, staphylococcus or any other "cous" you please, it simply means dirt. It indicates a dirty cow, a dirty milk vessel, a dirty milker, a dirty stable. Change this to scrupulous cleanliness.

A clean cow, clean milk vessels, a clean milker, a clean stable in which the milking is done and fully half the victory is won.

After the milk is drawn you want to shorten your "line of defense" by running it through the separator immediately. When I say separator, I do not mean water can. This reduces the bulk by at least six-sevenths, and this smaller quantity can so much more easily be kept from contamination.

Observe the same rules of cleanliness with the separator and cream cans, and place where cream is kept and ripened. Run the cream from 38 to 40 per cent. butter fat. Be careful it does not get too acid. Churn at the lowest possible temperature. Always use a thermometer. If you guess at or test cream by sticking in the finger, as is often done, my word for it you will have a pack of trouble. (Witches are apt to get into cream, tested that way and the butter will not come.)

Use a plain barrel or box churn that turns end over end and has no inside fixtures. Stop the churn when the butter is in granules about the size of half a wheat grain. Drain off the buttermilk and wash with weak lime at about same temperature as cream, or in summer a little lower. Now remove the butter from the churn with a ladle, and whatever you do, never, never, touch the butter with the hand.

The human hand is warm enough to melt the butter, and then it is butter no more, but grease and you will sell it at grease prices. Salt not to your notion, but to your customers. Work it just enough to properly incorporate the salt and not a second longer.

Put the butter up in a neat print, wrap it in good parchment paper, and pack it in perfectly clean and sweet boxes. Boxes holding 50 pound prints made of one half inch white wood, can be bought for 12 or 15 cents each, and there is no occasion to use them after the wood turns brown and the box smells rancid. Take new ones and let the boy have the old ones for chicken nests. It pays.

Now you have the finest butter boxed up to sell. Of course you are modest, all farmers are, and you don't like to blow about your wares and yourself, but my dear sirs, I learned that this is an awful selfish world, and unless we make ourselves and our wants known, we are going to be left. We must fall into line with the business world of to-day and advertise as does every other business man. Convince every buyer that you have the very best that is to be had and then back up your statement with your goods, and my word for it you will have two or three customers for every pound of butter you can produce, and then is the time you can make the price and not the buyers.



INDEX OF AUTHORS.

B.

	Page.
BECK, FLOYD W., Effort, essential to success,	304
BINGHAM, MRS. MANETTA, How to lighten the labors of the farmer's wife,	336
BURNS, J. S., Education for country children,	418

C.

CALHOUN, ALMA, Home influences,	321
CAMPBELL, J. T., Maintenance of soil fertility the base of successful farm operations,	298
CLINTON, PROF. L. A., A balance ration for plants; how to get it,	373
CONARD, Dr. M. E., Importance of hygiene in the dairy,	242
An inexpensive and up-to-date cow stable,	395
COOKE, PROF. WELLS W., Relative value of fodders,	377
COOPER, CALVIN, Spraying; its uses and abuses,	148

D.

DETRICH, REV. J. D., Eighteen years in soiling,	389
DOAK, F. S., The farmer boy: his environment, training and chance of success,	315

F.

FESTER, MARY S., Culture of flowers,	340
FLEMING, LIZZIE, School libraries,	267
FORNEY, D. P., Address of welcome to Dairy Union,	159
FREAR, DR. WM., Lime and its uses,	398
FRITZ, EDMUND S., The problem of the boy,	333

G.

GERNET, FRANK T., The ideal farmer,	288
GROFF, DR. GEO. G., The fruits and vegetables of Porto Rico,	125
GUTSHALF, S. A., Fruit growing for profit,	286

H.

HAMILTON, HON. JOHN (Secretary of Agriculture). The necessity of additional legislation for the protection of the fruit interests of Pennsylvania,	129
The Oleo laws of Pennsylvania,	246
HEILMAN, JOHN J., The betterment of rural schools for the benefit of the farmer,	269
HERR, J. A., Some essential features which an institute lecturer should possess,	447
HILLS, DR. JOS. L., Milk making in the twentieth century,	192
What makes the milk and cream tests vary so?	211
HOETZ, MISS ANNIE, Raising poultry for profit,	284
HOFFMAN, CORA MAE, Opportunities for country boys,	274

J.

JORDAN, DR. W. H., Plain facts about commercial feeding stuffs,	231
---	-----

K.

KEARNS, MRS BERTHA A., Evenings in the country home,	361
KNUPPENBURG, D. A., What arrangement should be made for the entertainment of local lecturers,	444

L.

LIGHTY, L. W., The Pennsylvania farmer as a dairyman; retrospective and prospective,	450
--	-----

M.

MENGES, PROF. FRANKLIN, The advantages of a knowledge of chemistry on the farm,	436
McCALMONT, JAS. P., Emphasis in farming,	276
McSPARRAN, W. F., The farmer's education,	423

O.

ORR, T. E., Instructions to beginner in the poultry business,	431
---	-----

P.

PATTERSON, Dr. H. J., Protein,	165
PATTERSON, JOHN J., Poultry raising,	294
PEACHY, J. H., The farmers' boy; his education,	426
PECK, C. L., The future of condensed milk,	176
PEARSON, DR. LEONARD (State Veterinarian), The farmer as a manufacturer of milk,	414
PHILIPS, THOS. J., Renewed fertility and how to get it,	392
PIERCE, LAURA C., Sanitation of the home,	357

Page

R.

REMAY, W. J., Advantages to the farmer of diversified knowledge,	343
ROBBINS, HOWARD, Knowing; for what purpose?	328
RODGERS, MISS ANNA B., Home,	326
RUBLE, LAWRENCE, To have and to hold,	326

S.

SCHOCK, OLIVER D., Horticultural displays at fairs,	141
SHARPLESS, JOS. C., Response to address of welcome for Dairy Union,	162
SHARPLESS, P. M., The influence of the cream separator upon the dairy industry,	181
SIBLEY, E. H., Some essentials of success in breeding dairy cattle,	203
SNAVELY, H. C., Report of general fruit committee,	107
STOUT, W. H., Horticulture,	137

T.

THAYER, DR. I. A., Preparation of the seed bed,	383
TOWER, F. W., Poultry,	292
TREXLER, KATE LOUISE, Misinterpretation of term farmer,	352

V.

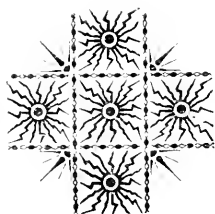
VANTINE, PROF. A. M., Flowers, salt, soap-suds and turpentine,	341
VOORHEES, DR. EDWARD D., Soiling, and soiling crops,	257

W.

WANNAMAKER, A. D., Nature study for country schools: how introduced,	301
WATTS, PROF. R. L., Care and management of orchards,	408
WERT, MISS VELMA, The dignity of farm labor,	287

Z.

ZIMMERMAN ISAAC, Our country homes, the stronghold of our State and nation,	36
---	----



INDEX OF SUBJECTS.

A.

	Page.
Act establishing Department of Agriculture,	5
Act incorporating Pennsylvania State Agricultural Society,	16
Act establishing State Board of Agriculture,	27
Act establishing State Live Stock Sanitary Board,	56
Act protecting health of domestic animals,	58
Act, supplement to, for taxation of dogs,	61
Act for prevention of disease from carcasses of animals,	62
Agricultural education, legislation concerning,	136

B.

Boy, problem of the,	333
Boy, three worlds for the,	333
Boys, country, opportunities of the,	274
Boys, farmers', what they have done,	275
Bulletins, Department,	10

C.

Chemistry in farming, importance of knowledge of,	436
Chestnut culture, discussion of,	122
Country boys, opportunities of,	274
Cow-stable, an inexpensive and up-to-date,	395
Cow-stable, how to construct a,	396
Crops, soiling of,	251
Crops, forage, food in,	252

D.

Dairy, importance of hygiene in the,	242
Dairying, essentials of,	451
Dairy cattle, essentials of success in breeding of,	203
Dairy cattle, selection of sire,	204
Dairy cattle, inbreeding of,	206
Dairy industry, influence of the cream separator upon the,	181
Dairy industry, creamery systems,	184
Dairy industry, the Moody system of separator,	185
Department of Agriculture, publications of,	9

E.

Education for country children,	418
Education, the farmers',	423
Education of the farmers' boy,	426
Education of the farmers' boy, elements of,	429
Effort, essential to success,	304

F.

Fairs, horticultural displays at,	141
Farmer, the ideal,	288
Farmer, misinterpretation of term,	353
Farmer, as a manufacturer of milk,	414
Farmers, what they should hold to,	326
Farmers' what they should not hold to,	327
Farmers, classes of,	353
Farmers, importance of occupation,	354
Farmers, educated,	423
Farming, emphasis in,	276
Farming, preparations for,	281
Farming, maintenance of fertility, base of successful operation,	298
Farming, preparation of the seed-bed,	384
Farming, purposes of seed-bed preparation,	384
Farming, how to prepare seed-bed,	386
Farming, when ploughing should be done,	387
Farming, importance of a knowledge of chemistry in,	436
Farming, use of manure in,	440
Farming, commercial fertilizer in,	441
Farming, rotation of crops in,	443
Farmer, the, of Pennsylvania as a dairyman-retrospective and prospective,	450
Farmers' boys, their environment, training and chances of success,	215
Farmers' boys, opportunities of,	274
Farmers' wives, how to lighten their labors,	336
Farm labor, dignity of,	280
Farmers' Alliance, officers of,	81
Farmers' Alliance, constitution and by-laws of,	82
Farmers' clubs, list of,	89
Farmers' institutes, county chairmen of,	45
Farmers' institutes, list of State lecturers,	47
Farmers' institutes, supplemental list of lecturers,	48
Farmers' institutes, Department lecturers,	48
Farmers' institutes, directions for constituting local committees,	49
Farmers' institutes, minutes of round-up meeting,	41
Farmers' institutes, programme of round-up meeting,	53
Farmers' institutes, papers read at round-up meeting,	371
Farmers' institutes, papers read at, during season, 1900-1901,	265
Farmers' institutes, arrangements to entertain lecturers at,	444
Farmers' institutes, essential features a lecturer should possess,	417
Feeding stuffs, plain facts about,	231
Feeding stuffs, classes of,	233
Feeding stuffs, mixtures and adulterations of,	236
Fertility, how to get it,	392

	Page.
Fertility, importance of farm manure,	393
Flowers, culture of,	310
Flowers, kinds to cultivate,	311
Flowers, variety of,	359
Fodders, relative value of,	377
Forage crop, variety of,	253
Fruits of Porto Rico,	125
Fruit interests of Pennsylvania, legislation for protection of,	129
Fruit growing for profit,	286

G.

Grange, State, officers of,	73
Grange, origin of,	75

H.

Home influences,	321
Home, essentials of a good,	323
Home, what it should be,	325
Home, sanitation of the,	357
Home, needs of the,	358
Home, appliances of the,	359
Homes, country, how to spend evenings in,	361
Homes, country, value of evenings in the,	362
Homes, country, stronghold of the nation,	365
Homes, country, influence of mothers in,	368
Homes, country, development of moral principle in,	369
Horticultural Association, officers of,	98
Horticultural Association, constitution and by-laws of,	99
Horticultural Association, programme of annual meeting,	101
Horticultural Association, membership of,	103
Horticultural Association, report of annual meeting,	106
Horticultural Association, report of general fruit committee,	107
Horticultural Association, observations of correspondents,	112
Horticultural Society of Pennsylvania, officers and committees of,	69
Horticultural Society of Pennsylvania, rules governing exhibitions,	72
Horticulture,	137
Horticultural display at fairs,	138

I.

Institutes, farmers', county chairmen of,	45
Institutes, farmers', list of State lecturers,	47
Institutes, farmers', suggestions to county managers,	50
Institutes, farmers', minutes of round-up meeting of,	41
Institutes, farmers', papers read at round-up meeting,	371
Institutes, farmers', papers read at, during season, 1900-1901,	265

K.

Knowledge, for what purpose,	328
Knowledge, progress of,	330

	Page.
Knowledge, necessity of,	331
Knowledge, advantageous to farmer,	343
Knowledge, gained from newspapers,	347

L.

Letter of transmittal,	3
Lime and its uses,	398
Lime, functions of,	400
Lime, chemical reaction of,	405
Lime, effect on soil texture,	406
Lime, practical questions concerning,	406
List of Department Officials,	1
List of Department Publications,	9
List of Department Bulletins,	10
List of farmers' clubs,	89
List of local agricultural societies,	90
List of local agricultural societies holding fall exhibitions,	92
Live Stock Sanitary Board, officers of,	56
Live Stock Sanitary Board, act establishing,	56
Live Stock Sanitary Board, rules for enforcing act,	64
Live Stock Sanitary Board, extract of rules of,	64
Live Stock Breeder's Association, officers of,	67

M.

Milk and cream tests, why they vary so,	216
Milk and cream tests, variations of,	212
Milk and cream tests, apparatus for,	222
Milk and cream tests, errors of ignorance,	223
Milk and cream tests, errors of intent,	224
Milk and cream tests, sampling,	225
Milk, future of condensed,	176
Milk making in the twentieth century,	192
Milk making in the twentieth century, changes anticipated,	193

O.

Officials, Department, list of,	1
Officers of Pennsylvania State Agricultural Society,	16
Officers of State Board of Agriculture,	25
Officers of State Live Stock Sanitary Board,	56
Officers of Live Stock Breeders' Association,	67
Officers of Pennsylvania Horticultural Society,	69
Officers of Patrons of Husbandry,	73
Officers of Farmers' Alliance,	81
Officers of State Poultry Association,	95
Officers of Dairy Union,	156
Oleomargarine, laws of Pennsylvania on,	246
Oleomargarine, differences in old and new law,	247
Orchards, enemies of,	352
Orchards, care and management of,	409
Orchards, site of,	410
Orchards, windbreaks for,	411
Orchards, selecting trees for,	411

P.

Patrons of Husbandry, officers State Grange,	73
Patrons of Husbandry, origin of the Grange,	75
Patrons of Husbandry, declaration of purposes of,	76
Pennsylvania State Agricultural Society, officers and committee of,	11
Pennsylvania State Agricultural Society, act incorporating,	16
Pennsylvania State Agricultural Society, constitution and by-laws of,	18
Pennsylvania State Board of Agriculture, members of,	23
Pennsylvania State Board of Agriculture, officers of,	25
Pennsylvania State Board of Agriculture, act establishing,	27
Pennsylvania State Board of Agriculture, minutes of annual meeting,	30
Pennsylvania State Board of Agriculture, minutes of meeting held at State College,	38
Pennsylvania State Live Stock Sanitary Board, act establishing,	56
Pennsylvania State Live Stock Sanitary Board, officers of,	56
Pennsylvania Live Stock Breeders' Association, officers of,	67
Pennsylvania Horticultural Society, officers of,	69
Pennsylvania Horticultural Society, rules governing exhibitions,	72
Pennsylvania Farmers' Alliance, officers of,	81
Pennsylvania Farmers' Alliance, constitution and by-laws of,	82
Pennsylvania State College, faculty of,	83
Pennsylvania State College Agricultural Experiment Station, officers and assistants of,	85
Pennsylvania Forestry Association, officers and council of,	86
Pennsylvania State Poultry Association, officers of,	95
Pennsylvania State Poultry Association, constitution of,	96
Pennsylvania Dairy Union, officers of,	156
Pennsylvania Dairy Union, papers read at annual meeting of,	157
Poultry, value of on farm,	292
Poultry, breeds of,	292
Poultry raising for profit,	281
Poultry raising, value of,	294
Poultry raising, how to make it profitable,	295
Poultry raising, importance of breed,	296
Poultry raising, incubators,	297
Protein, producing of,	165
Protein in pastures,	168
Protein, what feeds are best producers of,	168
Protein, yield of, by available crops,	170
Protein, yield of, increasing,	172
Publications of Department,	9

S.

San José Scale, laws for its suppression,	153
Schools, country, benefit to the farmer,	269
Schools, country, need of agricultural studies in,	272
Schools, country, centralization of,	272
Schools, country, nature study in,	298
School libraries, importance of,	267
Soils, fertility of,	248
Soils, absorptive power of,	208

	Page.
Soils, elements of,	373
Soils, study of,	374
Soils, fertilizers for,	375
Soiling and selling crops,	251
Soiling, eighteen years experience in,	389
Spraying, uses and abuses of,	148
State Agricultural Society of Pennsylvania, act incorporating,	16
State Agricultural Society of Pennsylvania, officers of,	14
State Agricultural Society of Pennsylvania, constitution and by-laws of,	18
State Board of Agriculture, members of,	23
State Board of Agriculture, officers and committees of,	25
State Board of Agriculture, act establishing,	27
State Board of Agriculture, certificate of membership,	28
State Board of Agriculture, minutes of annual meeting,	30
State Board of Agriculture, minutes of meeting held at State College,	38
State Live Stock Sanitary Board, officers of,	56
State Live Stock Sanitary Board, act establishing,	56
State Live Stock Sanitary Board, act protecting health of domestic animals,	58
State Live Stock Sanitary Board, rules for enforcement of act,	59
State Live Stock Sanitary Board, act for taxation of dogs,	61
State Live Stock Sanitary Board, act for prevention and spread of disease from carcasses of animals,	62
State Live Stock Sanitary Board, extracts rules of,	64
State Grange, officers of,	73
State Farmers Alliance, officers of,	81
State Farmers' Alliance, constitution and by-laws of,	82
State College, faculty of,	83
State Poultry Association, officers of,	95
State Poultry Association, constitution and by-laws of,	96
State Horticultural Association, officers of,	98
State Horticultural Association, constitution and by-laws of,	99
State Horticultural Association, programme of annual meeting,	101
State Horticultural Association, membership of,	103
State Horticultural Association, report of annual meeting,	106
State Horticultural Association, report of general fruit committee,	107
State Horticultural Association, observations of correspondents,	112



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